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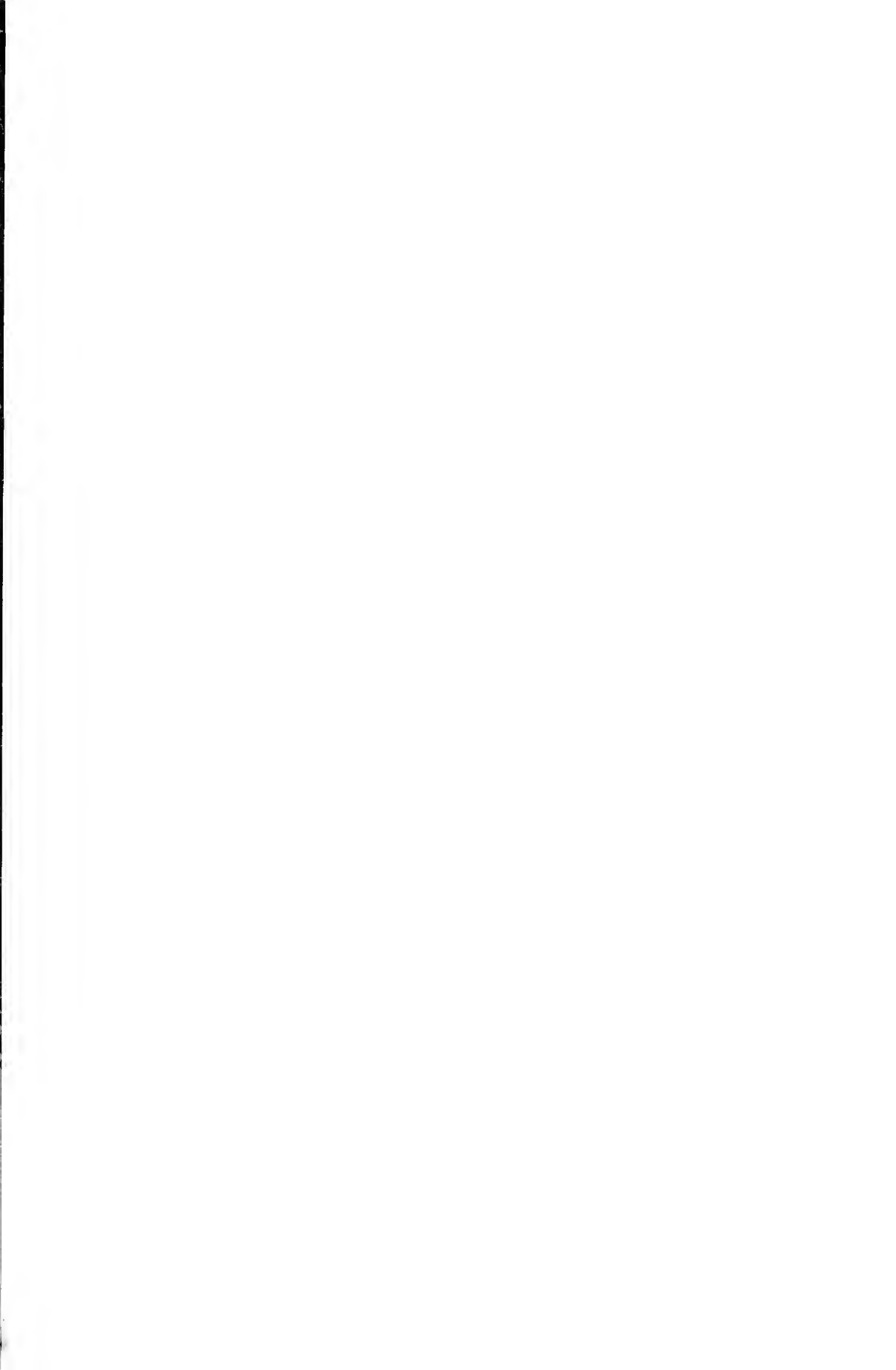
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ANALYSIS OF FOOD AND AGRICULTURAL POLICIES FOR THE EIGHTIES



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R. G. F. Spitze and Marshall A. Martin

Editors

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North Central Regional Research Publication No. 271
Illinois Bulletin 764

Agricultural Experiment Station
College of Agriculture
University of Illinois at Urbana-Champaign

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R.G.F. Spitze and Marshall A. Martin
Editors

Agricultural Experiment Stations of Illinois,
Indiana, Iowa, Kansas, Michigan, Minnesota,
Missouri, Nebraska, North Dakota, Ohio,
South Dakota, and Wisconsin, and the
U.S. Department of Agriculture, cooperating.



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The Illinois Agricultural Experiment Station provides equal opportunities in programs and employment.

PREFACE

Public policy continues to evolve, affecting this nation's food supply, prices, and trade, as well as the economic welfare of its farmers and rural communities. During 1980-1981 policy decision makers, organization leaders, and representatives of consumers and farmers will be especially concerned with these policy decisions in view of the approaching termination of the Food and Agriculture Act of 1977.

This publication provides a synthesis and interpretation of the existing knowledge on food and agricultural policy issues that should be useful to the various participants involved in these upcoming public decisions. It presents objectively the characteristics of the primary public policy problems, the trends in relevant economic data, the provisions and consequences of the 1977 Act, and selected policy alternatives.

The research underlying this publication was pursued by an inter-regional team of researchers from several states and the USDA. It was authorized and is published under the auspices of a North Central Regional Policy Research Project—designed to provide cooperative professional attention to this important area of the nation's agricultural and food policy. A brief glossary of selected terms and concepts pertaining to this research is included at the end of this publication to facilitate its usefulness to the range of intended readers.



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1 POLICY ENVIRONMENT AND ALTERNATIVES

Marshall A. Martin and R.G.F. Spitze

PURPOSE AND SCOPE

Analysis of Food and Agricultural Policies for the Eighties is a synthesis of current research knowledge on the public problems and policies concerned with: farm product prices, food prices and supply, farm family income, income transfers for food, agricultural trade, and their Treasury costs. Food and farm policy discussions sometimes speak to problems and interests of consumers as though they were separate from those of farm producers. In contrast, this analysis emphasizes their interrelationships in the actual policy development process. Other policy areas such as credit, land use, rural development, and tax policy are not addressed in this publication. The primary focus of the bulletin is on the policy provisions contained in the Food and Agriculture Act of 1977.

The public of this nation will have the opportunity, and indeed responsibility, to make major decisions about its agricultural and food system prior to December 31, 1981. That marks the termination of the Food and Agriculture Act of 1977. This Act has set the policy course for the period 1977-1981 for such programs as: food stamps, a farmer-owned national grain reserve, farm commodity price supports, land set-aside, deficiency payments and disaster protection, food aid to foreign countries, selected international trade provisions for agricultural products, and research and education activities for many areas of the food system.

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Prior to that date national attention will be focused on understanding the evolving economic situation and on developing alternative policy proposals. Questions must be answered about the nation's vital food supply, the equity impacts of policies on affected interest groups, effects of program costs on inflation, and the future structure of the agricultural sector. While discussions often prevail at broad levels of generality, policies are often designed to serve the particular needs posed by regions and commodities. Congress and the Executive Branch will be debating and choosing a public policy position about these same questions in the months prior to the expiration of the 1977 Act. The outcome will be a package of provisions from an infinite array of alternatives, ranging from extending the present policy without change to allowing its termination with subsequent reversion to existing permanent farm legislation.

These public policy decisions will be determined by the knowledge of the numerous participants, their varied experiences, their different values and goals, and by eventual consensus and compromise among them. Knowledge will be gleaned from documents generated over a half century of agricultural and food policy experience, from current media sources, from accumulated research, and from new analyses specific to the relevant policy area.

The purpose of this bulletin is to provide research knowledge for policy decision makers, their staffs, and other professional policy workers. Future research needs are also identified. This bulletin represents the joint efforts of policy researchers in Land Grant Universities, the Economics, Statistics, and Cooperatives Service of USDA, and other federal research agencies under the auspices of the regional Hatch Cooperative State-Federal Research Program. As a source of current reliable information, it will join other similar publications of Congressional committees, federal Executive offices, and many private research organizations.

Sources for this bulletin include the current findings of policy research as reported in professional journals and bulletins, the extensive documentation of the Food and Agriculture Act of 1977, the literature of the past half century in the agricultural and food policy area, and the insights of a selected group of professional policy workers from the several regions of the nation and from Washington D.C. Those findings arise from a systematic review, synthesis, and interpretation of existing theoretical and empirical knowledge. Particular emphasis is given to the content and consequences of the 1977 Act, since it serves as a primary base for future policy discussions and choices.

In the policy formation process individuals, private organizations, and public officials will propose and defend specific policies. The quality of those proposals for helping shape the best policy in the public interest depends upon the quality of the knowledge available to and understood by those offering the proposals. This publication will describe past policies, present policy, and possible alternative future policies. It attempts to report objective, reliable information—positive knowledge in logical terms—and is not intended to propose, promote, or advocate a particular policy. The policy formation process itself will decide what future policy will best represent the public interest.

CONTENTS

Introduction, Review of the 1977 Act and Economic Trends. Attention is given to the origin, rationale, and evaluation of the 1977 Act and to the content of its specific provisions. Data for the time period 1960-1979 are presented for several critical variables, e.g., production, prices, income, and trade, that commonly are used in characterizing the policy problems and evaluating the effects of past policies.

Policy Problems and Alternatives for the 1980s. The policy problems believed most likely to be important in the 1980-1981 policy formation period are briefly and succinctly analyzed. These particular problems were chosen either because they have continued as critical price and income issues or because new concerns have recently emerged. Their selection was based on the judgments of a large group of professional policy workers. The topics selected reflect the key provisions in the 1977 Act and the issues and concerns frequently raised by farmers, consumers, and various farm leaders and policy makers. The policy problem areas treated in this publication are:

1. Farm prices and income.
2. Agricultural policy and food prices.
3. Agricultural trade policy issues.
4. Structural changes in farming.
5. Grain reserve policies in an uncertain world.
6. The food stamp program.

For each area the analysis systematically covers the following aspects of the policy problem:

1. Characteristics of the problem.
2. Theoretical and empirical research.
3. Recent data.
4. Selected policy alternatives.

Each of the selected policy alternatives could be a logical public response to solve the problem. Included with each alternative are specific provisions or packages of policy instruments, along with the expected consequences for the major economic sectors including consumers, producers, traders, rural communities, and taxpayers. For each of the first four problem areas only those consequences for the economic sectors most directly affected are analyzed. Common alternatives are presented for these same four problem areas. Since the last two problem areas—grain reserve policies in an uncertain world and the food stamp program—have distinctive characteristics, they follow a different format. Special emphasis is given to innovative—perhaps untried—policy alternatives to provide maximum knowledge for policy makers.

COMMON ALTERNATIVES FOR ANALYSIS

A common set of selected policy alternatives are discussed below for the first four policy problems identified above. These policy alternatives were chosen to represent those both likely to receive attention in the policy development process and to encompass a range of the different possibilities. The analysis emphasizes the commodity provisions and not the food stamp, grain reserves, foreign food aid, disaster, or research provisions.

Continuation of the 1977 Act (the CONTINUATION alternative)

If the primary commodity provisions of the Food and Agriculture Act of 1977 were continued, a nonrecourse price support loan would be set each year at the discretion of the Secretary of Agriculture to stabilize prices for most crops. They would be no less than those listed for the most recent year in Table 1 (at the end of this chapter) and would generally reflect yearly average equilibrium and world prices. To qualify for this and other benefits, producers would need to comply with any minimal set-aside (optional production control)

requirements in effect. Temporary government stocks would be used to support this minimum price (loan level) by evening out supply over the marketing period with either annual storage and resale prerogatives or a three to five-year grain reserve.

Furthermore, set-aside and additional paid diversion would be used (optional to producers) to balance and stabilize production over time so that on the average all production would move through the commercial market eventually at or above the minimum loan level. This production control approach would focus only on the land input, and relate the set-aside to the current planted acreage of that commodity and relate the total crop acreage of the farm to some nationally desirable proportion of the historical total crop acreage.

Finally, for added income protection to producers, a target price would be set for each commodity at a level that reflects changes in a two-year moving average of per unit costs of production. These production costs would include variable inputs, machinery overhead, and general farm overhead operations, but not land. The target price would follow the same path as those depicted for the years contained in Table 1. For eligible producers, this level of income return per unit would be assured, based on their production. The returns would come either from the marketplace or from the market price plus a compensatory payment from the government to make up any difference between the target level and the higher of the average market price or the loan level. A limitation would exist on the total of these payments to any producer of about \$50,000 per year.

Compensatory Payments (the COMPENSATORY alternative)

This alternative emphasizes income protection to producers of farm products without any production controls or interference in market prices. A total per unit target return deemed desirable in public policy would be established for every affected product at the commencement of the production year. The compensatory payment would be based on a target price level approximately between the price support and target price provisions of the CONTINUATION alternative. Producers would make their independent production and marketing decisions based on this average expected return. With all production moving through domestic and foreign markets at market clearing levels, any resulting discrepancy between the average market price achieved and the target unit returns would be compen-

sated on the average with direct government payments to producers based on the volume of their sales. Since not all producers would produce the same quantity/quality of product nor receive the same market price, the uniform per unit payments would preserve the spread of individual returns around the averages of all producers. The stable target return, at least equal to equilibrium levels, would tend to bring forth a positive supply response, which in turn would lower market prices to both consumers and producers, resulting in expanding compensatory payments to the latter.

Since no monitoring of inputs nor stocks of price-supported products are associated with this alternative, it could be used for any product, such as livestock and perishable fruits and vegetables. The wool incentive payment program in effect since 1954 symbolizes this approach.

Effective Production Control (the CONTROL alternative)

This alternative emphasizes both price stability and income protection to major crop producers through a higher minimum loan (price support) for eligible production and through sufficiently effective production control provisions to ensure that the quantity being supplied over time would clear the market at the loan level. Minor shifts in the controlled production would be dramatically translated into income changes through the highly inelastic market demand. Thus, in comparison with the CONTINUATION alternative, the loan level would be higher, approximating its target price level, and the production control feature would likely be more restraining.

Government stocks would only be temporary to even out the quantity supplied within and between the marketing years. The loan level would float based on changes in the variable costs of production—similar to target prices in the CONTINUATION alternative. Production control would be achieved similarly through regulating the land input of the planted acreage on each affected producer's farm. Sufficient restrictions on imports and adequate export assistance for the price-supported commodities would be necessary to assure access to, but prevent interference from, foreign markets. Two different means of achieving the effective production control are possible.

Compulsory Control Option. With the compulsory option, the goal of effective production control is achieved by mandatory restriction

on each producer's use of a prime resource, i.e., land, or quantity of product marketed. Such a method usually would be selected following a favorable referendum among all producers. Since all producers of the affected crop must comply, the benefits of price supports are likewise available to them. Much more rigidity in cropping patterns and restrictions on entrepreneurial decisions on resource allocation accompanies this option as compared to the voluntary approach. The configuration of this option would resemble the existing tobacco policy and the policies generally in place for major crops throughout the 1950s and early 1960s.

Voluntary Control Option. With the voluntary option, the goal of effective production control is achieved by sufficient inducements to evoke from producers adequate voluntary withdrawal of production inputs, land, fertilizer, etc. Hence, those producers who perceive an economic advantage will participate and receive the loan (price support) and any other benefits, while others who rely solely on the market returns will not. Considerable entrepreneurial independence and flexible resource allocation discretion would remain. The inducements would likely necessitate direct government payments in addition to loan benefits. Partly due to the opposition of producers to compulsory programs of the previous decade, policy shifted toward this voluntary approach for most crops in the 1960s.

Innovative Alternatives

For each of the first four problem areas, one additional policy alternative is described and analyzed. These policy alternatives are presented as innovative approaches, different from those tried or commonly considered for these persistent problems in the agricultural and food area. It is hoped that they will provide new insights for the upcoming policy development process.

HISTORICAL TRENDS: 1960-1979¹

During the period 1960-1979 there were substantial changes in the economic characteristics particularly important to agricultural and food policy. In order to adjust for inflationary trends in the economy, 1972 will be used as the base year for "constant dollars." Farm prices, cash receipts, capital gains, and income were highly

variable. Export sales increased sharply. Foreign food aid declined in relative importance, i.e., in percent of all exports and in constant dollars. Government food and agricultural program payments were variable. Off-farm income became a major source of income for farm families. The structure of American agriculture also exhibited considerable and persistent change toward fewer but larger farms. Farm productivity and total output continued their historic recurring increase.

Prices

During the period 1960-1979, farm prices doubled, increasing at an annual rate of 4.5 to 5.0 percent—about the same rate as the Consumer Price Index, the Food Price Index, the Prices Paid by Farmers Index, the Producer Price Index, and the Implicit GNP Deflator. However, the patterns have been different. Farm prices lagged the others in the 1960s, far exceeded them in the early 1970s, and substantially followed again in recent years. After a period of relatively stable prices, farm and food prices have become more erratic and divergent. In the earlier period crop prices fell behind those of livestock, then surged ahead. In the late 1970s crop prices tended to fall while livestock prices, especially cattle, tended to increase.

Income

Current cash receipts from farming and gross farm income grew at an annual rate of 7 percent in 1960-1979. In constant dollars cash receipts and gross farm income grew about 2.4 percent per year. However, there were substantial oscillations within the period. While cash receipts from farming and gross farm income in constant dollars were unchanged to declining slightly in the 1960s, they rose sharply in the early 1970s. But by the late 1970s gross farm income and cash receipts in constant dollars were declining.

Government farm program payments were increasing more rapidly than market receipts, adding from \$1.0 to \$4.4 billion annually to gross farm income in constant dollars throughout the 1960s and early 1970s. In the mid-1970s they fell sharply to less than \$1.0 billion per year, but they have been increasing again since 1977.

Throughout this period rapid increases in the value of physical assets provided another major source of potential income for many farm families. Of course, property would have to be sold to realize this income. Also by 1970 off-farm income for the first time was contributing over half of all income received by farm families. The importance of off-farm income has grown throughout the period, except in 1973-1974 when there was a sharp increase in farm income. Per capita disposable farm income as a percent of nonfarm per capita disposable income rose from about 50 percent in 1960 to 110 percent in 1973. However, disposable per capita farm income has again lagged behind that of the nonfarm sector since 1973.

Aggregate net farm income in current and constant dollars grew much more slowly than gross farm income throughout the period. This was especially true in the 1970s relative to the 1960s when inflationary pressures began to push up input costs. Not only has growth in net farm income in constant dollars been negligible over the two-decade period, but it has also been erratic.

Agricultural Trade

U.S. agricultural exports grew slowly in the decade of the sixties, and then increased dramatically in the 1970s. The value of U.S. agricultural exports in constant dollars experienced a three-fold increase from 1960 to 1979. This growth made a substantial contribution to the increase in farm prices and income. Currently agricultural export sales account for one out of every four dollars of U.S. gross farm income. U.S. agricultural exports grew more rapidly than imports, contributing to a steady positive growth in the U.S. agricultural balance of trade.

Output and Productivity

Total farm output has consistently increased in the 1960s and 1970s at a rate of about 1.8 percent per year, with a lower rate in the early and a higher rate in the later part of the past decade. Farm productivity increases were similar.

Farm labor productivity grew faster than nonfarm labor productivity—about 6 percent for farm workers versus 2 percent for nonfarm

workers. However, growth in labor productivity dropped slightly in both sectors in the 1970s.

Structural Change

As a result of changing economic conditions, the structure of U.S. agriculture also changed throughout the period. Average farm size grew from 300 to 400 acres. The number of farms declined steadily, about 2 percent per year. The rate of increase in farm size and the rate of decrease in the number of farms both slowed down in the 1970s relative to the 1960s.

Throughout the period there was a marked shift in the proportion of income generated by different classes of farms, with the share of output produced by the larger farms increasing substantially. Many public policies are probable causes of these structural changes in agriculture. However, any changes due to farm commodity programs are minor relative to such policies as taxation and technology research.

Food Program Costs

Federal costs of all food programs grew dramatically from 1960-1979. Growth primarily occurred in the food stamp, school lunch, and WIC (Womens-Infants-Children) programs. The direct distribution of commodities to needy families has been essentially phased out. Over half of current total food program outlays go for food stamps. The rapid growth in participants slowed in the early 1970s. From 1975 through 1978 there was a decrease in federal support in constant dollars for the food stamp program and an unchanging total amount for all food programs. By the late 1970s changes in the food stamp eligibility requirements, increased unemployment, a continued high rate of inflation, and the elimination of the purchase requirement resulted in a significant increase in the number of food stamp recipients. Consequently, the spending cap initially set by Congress for fiscal 1980 was reached by May, and substantial funds were added in supplemental appropriations.

ENACTMENT, PROVISIONS, AND IMPLEMENTATION OF THE 1977 ACT

U.S. food and agricultural policy has been shaped and molded by an array of economic, technological, political, social, and humani-

tarian considerations. As a consequence, the Food and Agriculture Act of 1977 evolved as one of the most comprehensive pieces of agricultural legislation ever approved. Furthermore, its discretionary authority permits the Secretary of Agriculture to respond to rapidly changing economic and political conditions.

Policy Environment

The environment in which the Food and Agriculture Act of 1977 evolved was historically unprecedented. First, the period 1970-1976 was a unique combination of domestic and international events, which resulted in a sharp increase in farm prices and income. The high prices and worries over food shortages were followed by production increases that drove down farm prices at the same time that input prices continued to go up, resulting in a squeeze on farm income.

Periodic shortfalls in world grain production, especially in the USSR,² two major devaluations of the U.S. dollar and an eventual shift to a floating exchange rate, and continued growth in per capita income and population in most countries led to sharp increases in U.S. food prices, farm prices, farm income, and agricultural exports. Other relevant economic events in the U.S. in the 1970s that affected the agricultural situation were: wage and price controls, sharp increases in petroleum prices, double-digit inflation, and a severe economic recession in fiscal 1974/75. However, record U.S. crop harvests in 1975-1978, expanding world grain production, and a return of world grain stocks to levels experienced in the early sixties led to a decline in farm prices and income.

A second aspect of the evolutionary food and agricultural policy process was an increase in the number and diversity of interest groups that became concerned with food and agricultural policy. Environmentalists, consumer groups, and the hunger lobby joined the traditional farm organizations and commodity groups in helping to shape the policy agenda.

A third factor was the simultaneous expiration of previous legislation, which included the Agriculture and Consumer Protection Act of 1973, the Rice Production Act of 1975, funding and authorization for food stamps (the 1964 Food Stamp Act as amended), and authorization for Public Law 480 food assistance programs (The Agricultural Trade Development and Assistance Act of 1954 as extended.)

Bills were passed by both the Senate and House of Representatives in mid-1977 after unusually lengthy consideration. While there

were numerous modifications in the details of the various provisions in the legislation by a Senate-House Conference Committee, a major concern was over the potential Treasury cost. The Senate bill provided for higher target prices, implying a higher Treasury cost than the House bill.³ The Food and Agriculture Act of 1977 was finally approved by the Congress and signed into law by President Carter in September 1977.

Key Provisions

Although the 1977 Act contains few major changes from previous legislation, it does introduce important new policy provisions. Set to expire in 1981, it includes 19 titles that cover all major food and feed grains, extends Public Law 480 (Food for Peace) programs, extends and modifies the Food Stamp program, and authorizes additional food and agricultural research and extension activities. It also contains legislative provisions for dairy, wool, rice, cotton, peanuts, soybeans, and sugar.

The 1977 Act gives the Secretary of Agriculture considerable flexibility to carry out the various policy provisions. Only the primary provisions are summarized here.⁴

Loan Rates and Target Prices. Loan rates provide a price floor. They are used to determine the value of nonrecourse loans for eligible farmers and are utilized in the determination of trigger prices for the farmer-owned grain reserve. The Secretary of Agriculture has considerable discretion to adjust the level of the loan rates.

Target prices, a concept first introduced in the Agriculture and Consumer Protection Act of 1973, provide the framework for income protection for farmers through deficiency and disaster payments. Deficiency payments are made to eligible farmers when the market price falls below a predetermined target price during the first five months of the marketing year. In the 1977 Act the maximum allowable annual deficiency payment per farmer for wheat, feed grains, and upland cotton combined was \$50,000 for 1980 and 1981. Target prices and loan rates by year may be found in Table 1.

Disaster payments may be made for wheat and feed grains under two conditions: prevented plantings and low yields. Originally applying only through the 1979 crop year, the Agricultural Adjustment Act of 1980 extended the disaster payment provisions of the 1977 Act through the 1980 crop year.

Cost of Production. Previously, adjustments in commodity price support levels were based on changes in either parity or an index of prices paid by farmers for production items and changes in yields. The 1977 Act provides for annual adjustments of the target prices initially set for 1977 and 1978, based on USDA estimates of changes in national average per unit production costs for each commodity. The per unit cost of production is based on a two-year moving average of changes in variable costs, machinery ownership costs, and an allocation of general farm overhead costs, but not land costs.

Low grain prices and the resulting political pressure in 1977-1978 led to the Emergency Agricultural Act of 1978. This amended the 1977 Act, permitting the Secretary to increase the target prices for wheat, feed grains, and upland cotton when an acreage set-aside exists. As a result, the Carter Administration made some upward adjustments in target prices. When no set-aside program is in effect, the cost of production formula outlined in the 1977 Act must be utilized.

Although per acre production costs continued to rise, record yields in 1978 and 1979 coupled with no set-asides in 1980 would have resulted in lower target prices for wheat and feed grains in 1980. The Agricultural Adjustment Act of 1980 raises target prices above the cost of production formula levels provided for by the Food and Agriculture Act of 1977 (see Table 1).

Set-Aside. The 1977 Act replaced the historical farm acreage allotment with a new set-aside procedure. The Secretary must announce each year (before August 15 for wheat, November 15 for feed grains, and December 15 for cotton) the voluntary set-aside procedures and related farm program details for the next crop year.

Farmers who comply with the set-aside program are eligible for various program benefits, including deficiency payments, disaster payments, nonrecourse loans and the farmer-owned grain reserve. (See Table 1 for program details.)

Grain Reserves. The 1977 Act authorized a farmer-owned grain reserve, with the government setting minimum price support, intermediate release, and maximum call price levels. A wheat reserve of 300 to 700 million bushels is mandated with the Secretary authorized to determine the size of the feed grain reserve.

The grain reserve allows farmers to continue a nonrecourse loan on their grain for three to five years with a prepaid storage payment

and some interest and farm storage loan concessions. The maximum storage period so far has been three years. Farmers retain ownership of the grain and make the final marketing decisions but can be influenced by penalties. The reserve provides an opportunity for farmers to store in periods of low prices for later sale once prices rise. It also helps assure adequate supplies for export sales and aid, and greater stability of farm prices.

The 1977 Act calls for minimum release levels.⁵ If the loan is redeemed before the market price reaches the release level, the farmer must repay the loan plus any accumulated interest and return all earned and unearned storage payments plus interest (on the storage payments). The total repayment per bushel is the sum of the above or the release price, whichever is higher.

The Act also provides for maximum call price levels.⁶ The farmer is not required to remove grain from the reserve when the market price reaches the release level. The grain may remain in the reserve until the market price reaches the call level. At that time the loan must be paid off. The farmer may, however, elect to repay the loan and hold the grain if the market price is expected to go higher.

If there is grain in the farmer-owned reserve, the Commodity Credit Corporation (CCC) may not resell any of its stocks accumulated by annual price supporting at less than 150 percent of the current loan rate. If there is no grain in the reserve, the CCC resale price may not be less than 115 percent of the loan rate. These CCC resale limitations were included in the 1977 Act to prevent CCC activity that farmers felt might unduly depress farm prices.

Food Stamp Program. The 1977 Act identifies human nutrition as a basic responsibility of the USDA. In order to encourage eligible nonparticipant households to receive food aid, the food stamp purchase requirement was eliminated and the process for determining eligibility was simplified. Also, more stringent constraints were placed on program eligibility.

Implementation of the 1977 Act

The essential features of the 1978 program as provided in the 1977 Act were: a 20 percent set-aside for wheat and 10 percent set-aside for feed grains; early entry of 1977 crop wheat, barley, and oats into the grain reserve; an increase in the storage payments for the farmer-owned reserve; and expansion of farm storage facilities loans.

Although the size of the 1978 grain crops set new records, cash receipts from crops rose 10 percent, and net farm income increased 41 percent over 1977—due largely to a jump in exports and the initiation of the grain reserve program. Direct payments of \$866 million were made to wheat and feed grain producers. Both the wheat and feed grain reserve objectives were achieved by December 1978, with approximately 1.3 billion bushels in the reserve including 411 million bushels of wheat and 739 million bushels of corn.

There were only modest changes in the farm program for the 1979 crop year. They were: a 20 percent set-aside for wheat, and a 10 percent feed grain set-aside, with a 10 percent additional land diversion for corn and sorghum and a 20 percent set-aside for barley.

Crops in 1979 were again at record levels, and exports set new records in both volume and value. Crop prices remained strong, periodically surpassing the grain reserve release price levels. Crop receipts rose 20 percent, and net farm income increased 14 percent over 1978, growing slightly faster than the general rate of inflation. No deficiency payments were made for 1979 crops, except sorghum and barley.

In the fall of 1979, given the expectation of a high level of foreign and domestic demand and concern over inflation, the Secretary of Agriculture announced no set-aside program for 1980.

As a result of the suspension of grain and oilseed sales to the Soviet Union on January 4, 1980, several steps were taken to offset some of the economic impacts of the embargo. Since the embargo was for national security and foreign policy reasons, the 90 percent of parity provision in the 1977 Act for an embargo based on domestic considerations did not apply. The steps taken by the Carter Administration included:

1. Assumption of export contracts held by grain companies for grain sold to the Soviet Union beyond the 8 m.m.t. called for in the U.S.-USSR five-year Grains Agreement.
2. Increase in loan rates, release prices, and call prices.⁷
3. Additional incentives for grain to enter the farmer-owned reserve, i.e., increase storage payment and waiver of interest.
4. Purchase of wheat for an International Emergency Food reserve.
5. Additional Commodity Credit Corporation credit to finance export sales.

Although a paid feed grain diversion program was considered, it was not implemented. During the spring, wheat and corn were purchased by the CCC. The grain reserve was also briefly opened to farmers who did not participate in the 1979 set-aside program.

As new legislation is now being considered, the economic consequences of the 1977 Act are continuing to occur. Hence, its impacts are still not fully understood.

Background for the 1981 Legislation

Although there are several similarities in the present economic events and those just prior to the passage of the 1977 Act, there are also several notable differences. There have been two successive record crop years, and grain stocks have grown. However, the farmer-owned grain reserve has temporarily isolated some of this grain from the market. In spite of an embargo on grain sales to the Soviet Union, agricultural exports have continued to grow. Food price increases, while perhaps not as much of a concern to consumers as in the mid-1970s, continue to rise at a fairly rapid rate.

The focus of the debate and the provisions of the 1981 food and agriculture legislation will likely depend not only on the political and economic conditions in the period just prior to its passage but also on expectations about economic conditions through the mid-1980s. The chapters that follow attempt to evaluate the economic consequences of various policy alternatives under different assumptions about future economic conditions.

Table 1. Food and Agriculture Act of 1977: Selected Program Parameters, 1977-1980

Commodity Programs	1977	1978	1979 ^h	1980 ^h
Wheat				
Target price (\$ per bu.)	2.90 ^a	3.40	3.40	3.63 ⁱ
Loan level (\$ per bu.)	2.25 ^b	2.35 ^c	2.50	3.00
Reserve release level (\$ per bu.)	3.15	3.29	3.75	4.20
Reserve call level (\$ per bu.)	3.94	4.11	4.63	5.25
Set-aside (percent)	—	20	20	—
Diversion (percent)	—	—	—	—
Voluntary reduction (percent)	—	20	15	—
National program acreage (mil. acres)	62.2	58.8	67.6	70.0 ^g
Corn				
Target price (\$ per bu.)	2.00 ^a	2.10	2.20	2.35 ⁱ
Loan level (\$ per bu.)	2.00 ^b	2.00 ^c	2.10	2.25
Reserve release level (\$ per bu.)	2.50	2.50	2.63	2.81
Reserve call level (\$ per bu.)	2.80	2.80	3.05	3.26
Set-aside (percent)	—	10	10	—
Diversion (percent)	—	10	10	—
Diversion payment (\$ per bu.)	—	0.20	0.10	—
Voluntary reduction (percent)	—	5	10	—
National program acreage (mil. acres)	60.9	76.2	86.6	83.5 ^g
Sorghum				
Target price (\$ per bu.)	2.28	2.28	2.34	2.50 ⁱ
Loan level (\$ per bu.)	1.90	1.90	2.00	3.82

Table 1. Food and Agriculture Act of 1977: Selected Program Parameters, 1977-1980 (continued)

Commodity Programs	1977	1978	1979 ^h	1980 ^h
Reserve release level (\$ per bu.)	2.38	2.38	2.50	4.78
Reserve call level (\$ per bu.)	2.66	2.66	2.90	5.54
Set-aside (percent)	—	10	10	—
Diversion (percent)	—	10	10	—
Diversion payment (\$ per bu.)	—	0.12	0.10	—
Voluntary reduction (percent)	—	5	10	—
National program acreage (mil. acres)	16.4	13.7	15.3	14.7 ^g
Barley				
Target price (\$ per bu.)	2.15	2.25	2.40	2.55 ⁱ
Loan level (\$ per bu.)	1.63	1.63	1.71	1.83
Reserve release level (\$ per bu.)	2.04	2.04	2.14	2.29
Reserve call level (\$ per bu.)	2.28	2.28	2.48	2.65
Set-aside (percent)	—	10	20	—
Diversion (percent)	—	10	—	—
Diversion payment (\$ per bu.)	—	0.12	—	—
Voluntary reduction (percent)	—	20	30	—
National program acreage (mil. acres)	11.7	7.5	7.8	8.4 ^g
Oats				
Loan level (\$ per bu.)	1.03	1.03	1.08	1.16
Reserve release level (\$ per bu.)	1.29	1.29	1.35	1.45
Reserve call level (\$ per bu.)	1.44	1.44	1.57	1.68

Rye					
Loan level (\$ per bu.)	1.70	1.70	1.79	1.91	
Soybeans					
Loan level (\$ per bu.)	3.50	4.50	4.50	5.02	
Upland cotton					
Target price (cents per lb.)	47.80 ^a	52.00 ^b	57.70	58.4	
Loan level (cents per lb.) ^a	44.63	48.00	50.23	48.00	
Set-aside (percent)	—	—	—	—	
Diversion (percent)	—	10	—	—	
Diversion payment (cents per lb.)	—	2.0	—	—	
Voluntary reduction (percent)	—	20	15	10	
National allotment (mil. acres)	11.0 ^b	—	—	—	
National program acreage (mil. acres)	—	10.2	10.6	11.6	
Extra long staple (ELS) cotton					
Loan level (cents per lb.) ^b	76.70	83.20	92.95	93.50	
National marketing quota (1,000 bales)	113	97	137	161	
National acreage allotment (1,000 acres)	120.0	92.4	115.0	131.7	
Rice					
Target price (\$ per cwt.) ^a	8.25	8.53	9.05	9.49	
Loan level (\$ per cwt.) ^a	6.19	6.40	6.79	7.12	
Reserve release level (\$ per cwt.)	8.67	8.96	9.51	9.97	
Reserve call level (\$ per cwt.)	9.90	10.24	10.86	11.39	
Set-aside (percent)	—	—	—	—	

Table 1. Food and Agriculture Act of 1977: Selected Program Parameters, 1977-1980 (continued)

Commodity Programs	1977	1978	1979 ^h	1980 ^h
Diversion (percent)	—	—	—	—
National allotment (mil. acres) ^a	1.8	1.8	1.8	1.8
Sugar cane				
Loan level (cents per lb., raw value)	13.50	14.73	13.00	— ^f
Flue-cured tobacco				
Loan level (cents per lb.) ^a	113.8	121.0	129.3	141.5 ^d
Effective marketing quota (mil. lb.)	1,197	1,181	1,070	1,187 ^d
Effective national allotment (1,000 acres)	636	624	577	640 ^d
Burley tobacco				
Loan level (cents per lb.) ^a	117.3	124.7	133.3	— ^f
Effective marketing quota (mil. lb.)	684	651	650	780 ^d
Peanuts				
Loan level, quota peanuts (\$ per ton) ^b	410.50 ^e	420	420	455
Loan level, non-quota peanuts (\$ per ton)	—	250	300	250
Marketing quota (1,000 tons) ^b	2,069	1,680	1,596	1,516
Acreage allotment (1,000 acres) ^b	1,614	1,614	1,614	1,614
Flaxseed				
Support level (\$ per bu.)	—	4.50	4.50	4.50 ^d

Wool

Support level (cents per lb.) ^a	99	108	115	123
Mohair				
Support level (cents per lb.) ^b	149.8	164.7	194.3	290.3
Gum naval stores				
Loan level for gum rosin (\$ per cwt.)	16.75	21.40	23.75	— ^f
Honey				
Loan level (cents per lb.) ^b	32.7	36.8	43.9	— ^f
Dairy				
Support level for manufacturing grade (\$ per cwt.)				
April	9.00	9.87	10.51	12.07
October	9.43	10.76	11.22	12.80

^aSet by law.^bMinimum allowed by law.^cUnder provisions of the 1977 Act, the Secretary could have lowered the loan level for 1978 wheat and corn because the average market price received by farmers in the 1977 crop year did not exceed 105 percent of the loan.^dPreliminary.^eSupport level of \$430.50 minus \$20 per ton deducted for storage, handling, and inspection costs.^fNot yet announced.^gThe "voluntary reduction" in 1980 is that 1980 planted acreage not exceed 1979 considered planted acreage levels.

hThe loan rates and reserve release and call levels for wheat, soybeans, and feed grains are those announced in early January 1980 for the 1979 and 1980 crops, except as revised in July 1980. The 1978 levels were applicable prior to January 1980. Producers with reserve contracts outstanding on 1979 crops at the time of the January announcements may have slightly lower release or call levels than those announced unless they sign new three-year contracts.

iApproved by Congress and President in March 1980, Agricultural Adjustment Act of 1980. Farmers must comply with Normal Crop Acres (NCA) to qualify for these target prices. Otherwise they will receive target prices based on cost of production formula.

Primary Source: Nelson and Davison.

NOTES

1. See the Statistical Appendix for detailed trend data and rates of change.
2. There were actual decreases in agricultural production in the U.S. in 1970 and 1974.
3. For a brief review of these initial legislative proposals see USDA-ESCS (1977), Martin, and USDA-ESCS (1980).
4. For more complete detail on the provisions of the Food and Agriculture Act of 1977 see Spitze, Johnson and Ericksen, Stucker and Boehm, and Martin and Jones.
5. The Secretary may establish a minimum release level for wheat of not less than 140 percent nor more than 160 percent of the loan rate. The Secretary may select an appropriate release level for feed grains. Initially, the Secretary selected release percentages of 140 and 125 percent of the loan rate for wheat and feed grains, respectively. The release price for wheat was raised to 150 on January 7, 1980.
6. The Secretary must set the call level for wheat at no less than 175 percent of the loan rate. The call price for feed grains may be set at the discretion of the Secretary. The initial call percentages were 175 and 140 percent respectively. These percentages were raised to 185 and 145 percent respectively on January 7, 1980.
7. The release level for feed grains was kept at 125 percent of the loan rate. For wheat the release price was increased to 150 percent of the loan rate. The call price for feed grains was increased to 145 percent of the loan rate and to 185 percent of the loan rate for wheat.

REFERENCES

- Johnson, James and Milton Ericksen. *Commodity Program Provisions Under the Food and Agriculture Act of 1977*. Agr. Econ. Rep. 289, USDA-ERS, Oct. 1977.
- Martin, Marshall A. *Cost of Production: An Appropriate Guide for Setting Target Prices and Loan Rates?* EC-462, Coop. Ext. Purdue University, July 1977.
- Martin, Marshall A. and Bob F. Jones. "The 1980 Wheat, Feed Grains, and Reserve Programs." *Purdue Farm Management Report*. Dept. Agr. Econ., Purdue University, Jan. 1980.
- Nelson, Frederick J. and Cecil W. Davison. "Agricultural Food Policy Decisions: Update." *Policy Research Notes*. No. 9, Jan. 1980, pp. 6-19.
- Spitze, R.G.F., "The Food and Agriculture Act of 1977: Issues and Decisions." *Amer. J. Agr. Econ.* 60(1978): 225-235.

Stucker, Thomas A. and William T. Boehm. *A Guide to Understanding the 1977 Food and Agricultural Legislation*. Agr. Econ. Rep. 411, USDA-ESCS, May 1978.

USDA-ESCS. *Agricultural Food Policy Review*. AFPR-3, Feb. 1980.

USDA-ESCS. *Agricultural Outlook*. March 1977, p. 10, and April 1977, pp. 12-13.

2 FARM PRICES AND INCOME

R.G.F. Spitze and Marshall A. Martin

Governments directly influence farm prices and income in nearly every country in the world. In the United States various governmental farm price and income support programs have operated for nearly 50 years.¹ Programs in some form have been maintained since the late 1920s for most grains, cotton, tobacco, oilseed crops, wool, sugar, and milk. These commodities account for about half the cash receipts of farmers in the United States.

The objective of this chapter is to provide a framework for analyzing future alternative government policies that will influence farm prices and income. This framework includes a discussion of the characteristics of the problem, a review of relevant theoretical knowledge, and a summary of empirical information. The chapter closes with a brief evaluation of four policy alternatives.

CHARACTERISTICS OF THE PROBLEM

Historically, the problem to which price and income policy has been directed is characterized by unstable farm product prices, by unstable farm income, and by lower farm family income as compared to other segments of the economy. These characteristics have paralleled the very emergence of commercial agriculture. The problem has often been overshadowed or changed in recent decades by the low income problems of the 1930s, the relatively high farm prices of the 1940s, and the government commodity programs of the 1950s

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and 1960s. Price and income instability reemerged as a major problem of agriculture in the 1970s (Robinson).

Farm Product and Input Price Variability

Instability in agriculture can arise from natural and societal sources. It can also result from the interrelationships of these two influences, such as the recent blight susceptibility of hybrid corn. Societal sources of agricultural instability include: 1) business cycles, inflation, and economic recession, 2) market structure and organization, 3) the nature of the supply and demand for agricultural commodities, 4) commodity cycles, and 5) other domestic and foreign policy actions such as monetary policy, export embargoes, and exchange rate manipulation.

Agricultural prices tend to be unstable in the aggregate as well as at the level of individual commodity markets. The degree of instability varies over time and among commodities. Farm prices tend to fluctuate more than the prices of nonfarm goods and services due to structural and behavioral differences between the two sectors. The biological nature of agriculture often results in unanticipated gaps between expected and actual production, which in turn create dramatic price effects. In contrast, production in the industrial sector can be more easily adjusted as market conditions change.

Organizationally, agriculture tends to be composed of many individual producers who have no influence over product or input prices. This atomistic characteristic coupled with the biological production cycles for crops and livestock create unique price oscillations for most farmers. In the nonfarm sector there are often relatively few firms producing a given product. Such a market structure gives producers of nonfarm goods and services greater influence over the prices consumers pay and the volume of goods and services provided.

This instability of farm product prices creates problems for farmers, domestic consumers, exporters, businesses providing supplies and services to farmers, and other firms and individuals who are dependent upon the rural economy. Sharp price rises are welcomed by farmers, their suppliers and the rural community; however, they are disdained by consumers and exporters. Generally, falling commodity prices result in the opposite reactions. Hence, price variability has built-in problems regardless of the direction of the swing. The

severity of the reaction is closely related to the magnitude of the price swings. The more commercial and dependent the producers are upon purchased production inputs, the more obvious is the financial impact on their operations.

The uncertainty associated with farm product price variability is problematic since it adversely affects investment decisions in either farm or farm-related businesses, alters the allocation of resources, causes shifts in consumption expenditures, and hinders the development of foreign markets. Relatively, price variability is less problematic to those best informed and best able to bear price risk. Hence, price instability may weed out less efficient farmers and encourage larger operations capable of greater market power.

There are also problems with farm input costs. Prices paid by farmers for their production inputs are largely and increasingly determined in the nonfarm economy. Due to the organizational and structural nature of the nonfarm sector, farm input prices exhibit less variability than product prices.

Input price changes tend to lag behind changes in product prices during both rises and declines. This characteristic becomes a serious problem for farmers during product price declines because the more stable input prices create a cost-price squeeze that can be both sudden and severe. The opposite is true, of course, in periods of farm commodity price increases.

Since purchased inputs are becoming a larger part of total farm inputs, differences in farm price and cost movements lead to increased stress on farm operators. Furthermore, many of these purchased inputs are derived from petroleum, e.g., fuel, fertilizer, and pesticides. This creates another vexing problem for the farmer since petroleum price increases have far outpaced commodity price increases in recent years.

Levels and Stability of Farm Family Income

Due to the variability of product prices as well as the underlying variability of production, the farm income component of the total farm family income stream remains unusually erratic (Houck). However, the expanding off-farm component is generally quite stable.

The instability of farm prices and income is due to the inelastic supply and demand for primary agricultural products. In an industrial

economy such as the United States consumers spend a relatively small share of their income on food. Hence, there is little change in the quantity of food consumed even where there is a significant change in food prices. Given the biological nature of agriculture, the lags between production decisions and actual production changes, and the competitive organization of farming, farmers are unable to make rapid changes in aggregate production levels in response to major changes in product prices.

The unstable nature of farm family income has major repercussions for the farm family itself, farmers trying to enter the business, the associated agricultural businesses, and the rural community. For example, farmers with a high indebtedness can face bankruptcy due to cash flow problems in a period of sharply lower commodity prices and farm income. On the other hand, sudden actual or expected farm price and income increases can result in high asset values as land values are bid up. In fact, for some farmers capital gains may exceed current income.

In most industrial countries, including the United States, the major rationale for government intervention in the production and pricing of farm products, and for various income payments, has been the improvement of the income and welfare of farmers, both absolutely and relative to other economic sectors. Historically, with the exception of 1973, per capita farm incomes in the United States have lagged behind nonfarm incomes. It is commonly believed that, in the absence of government intervention, farm prices and income would fall to a point where farm families would suffer, more people would be forced off the farm, rural-urban migration would increase, and more rural towns would become economically depressed.

There are also pronounced differences in farm income levels between the producers of various commodities, between geographic regions, and between farmers within a given region. These differences in the distribution of income are a result of differences in: access to resources, educational levels, management skills, personal values and beliefs, market imperfections, historic development patterns, and certain public policies—and the vagaries of weather. Some high-income farmers make returns comparable to, or higher than, the highest in the urban sector of the economy. However, low income farm families comprise a higher than proportional segment of the poorest families in the total economy. Many farm families, in order to earn an acceptable income level, must also seek employment in the nonfarm sector.

THEORETICAL KNOWLEDGE

As introduced previously, one major reason for the variability of agricultural prices and incomes is the unique nature of the demand for agricultural products. Both price and income elasticities of demand for individual agricultural commodities and in the aggregate are relatively inelastic. Hence, any change in the quantity demanded leads to a proportionately greater change in price in the opposite direction. Furthermore, in a high-income country like the United States increases in per capita income result in only very little rightward shift (increase) in the demand for food.

The inelastic nature of the demand for farm products also holds implications for farm income. When the quantity supplied decreases without comparable changes in demand conditions, gross farm income increases. Conversely, an increase in the quantity supplied leads to a decrease in gross farm income. Consequently, economic events that tend to reduce farm production, *ceteris paribus*, increase farm prices and gross farm income (Tomek and Robinson).

Despite recent growth in foreign demand, which tends to be price elastic for a particular country such as the United States, the total demand for U.S. farm products appears to still be price inelastic (Brandow, 1961; George and King). Furthermore, greater dependence on foreign markets with few barriers to trade can contribute to both increased domestic price and income variability, as changes in uncontrollable demand or supply abroad are injected into the competitive domestic market. U.S. export demand can vary due to changes in world agricultural production, changes in exchange rates, or decisions made by marketing boards or authorities in centrally planned economies (Schuh).

The ultimate effect of such price variability is inefficient resource allocation due to greater difficulties in formulating expected prices. Hence, producers commit either too many or too few resources. While initially felt by farmers, the instability of farm prices and income rebounds through the agribusiness sector and rural communities, both of which depend upon the flow of income from agriculture.

Variability in farm commodity prices and income is also related to the unique nature of agricultural product supply, the fixity of the resource commitments, and the structure of input markets (Johnson; Tweeten). The supply is inelastic within the production period, which can vary from the growing season for some crops to several years in the case of livestock. The perishability of many agricultural

products also causes price oscillations during the marketing year.

Once farmers make an initial allocation of resources, it is difficult if not impossible in the short run for them to shift resources from one farm enterprise to another or entirely out of the agricultural sector. This fixity of resources leads to slow adjustments in output relative to changes in prices and related economic conditions. Hence, the aggregate and individual agricultural product supply responses tend to be quite inelastic with respect to price.

The implications of the unique nature of agricultural supply and demand under its highly competitive conditions of production and marketing are depicted in Figure 1. The farm firm is in equilibrium with price (P_e) and quantity of production (Q_e) and is just covering all costs (C) but with no excess profits. If costs increase (AC to AC'), production falls (Q_e to Q'). If the product price falls (P_e to P_1),

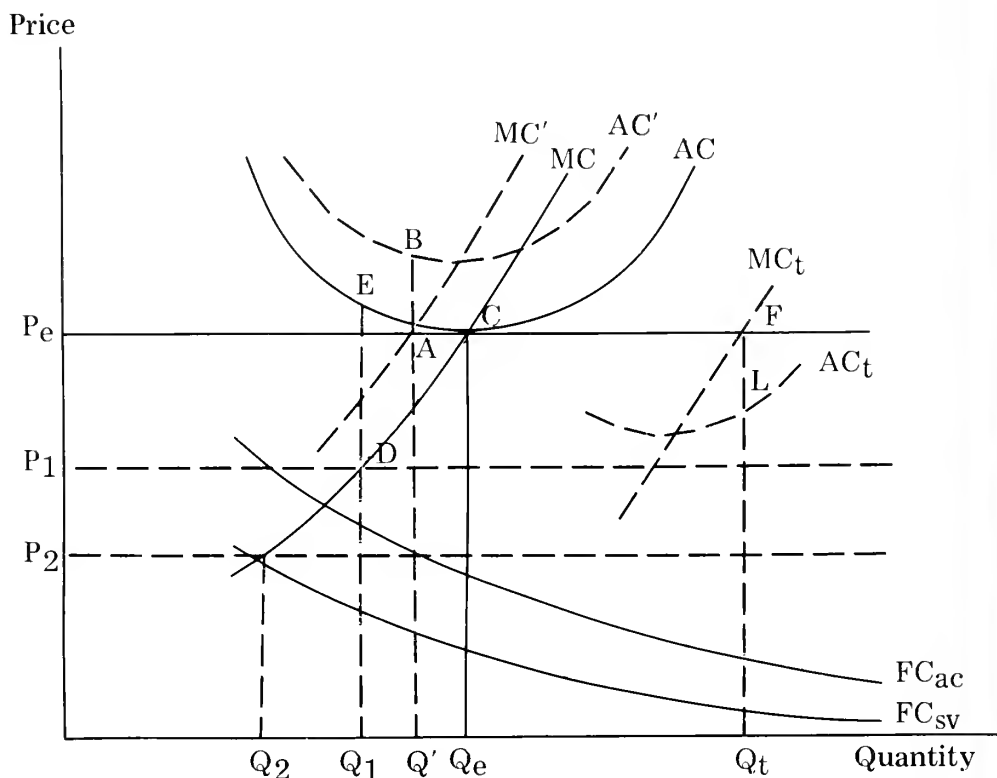


Figure 1. Effects of Costs, Prices, and Technology on the Farm Firm.

production falls (Q_e to Q_1). However, in both cases costs are greater than returns by (AB) and (DE), respectively, and there are losses in farm income. Yet, the allocation of the fixed resources to farm production is likely to continue as long as some returns above fixed costs are realized, as is still the case even at price P_1 . Agricultural producers generally can not individually (due to absence of market power) or collectively (due to numbers and diversity) directly alter such costs or prices to protect normal profit.

The problem of fixity of farm resources can also be depicted. A very low price level (P_2) with a level of production (Q_2) would not cover the variable costs nor even all the fixed costs (FC_{ac}). But assume (FC_{ac}) represents acquisition costs and that these resources have a lower salvage value (FC_{sv}) if they are transferred out of farming. Thus, with a salvage value lower than the minimum threshold price (P_2), production is likely to continue even at (Q_2). The impact on resource returns and farm income is clear: the low price permits only short-term survival; this production pattern can not continue in the long run.

Farm product supply is also significantly affected by the flow of technology. While a substantial amount of this technology is developed in the public sector, it is frequently further developed and disseminated by the private sector.

In an effort to increase the profit margin per unit of production, and thus net farm income, farmers adopt cost-saving and/or output increasing technology. Early adopters benefit as they reduce production costs with no changes in the product price. However, as more and more farmers adopt the technology, aggregate production increases (the product supply curve shifts to the right) and, *ceteris paribus*, the product price, per unit profits, and gross and net farm income decline. Production is likely to continue as long as variable and fixed costs (at perceived salvage value levels) are covered. Given inelastic product supply and demand, consumers benefit relative to producers as the quantity of food increases and its real price declines due to technological progress (Cochrane).

The economic impact of the adoption of new technology on farmers and consumers can be illustrated diagrammatically (Figure 1.). As new cost-lowering technology is injected into a competitive farm sector, average production costs may fall to (AC_t) with production expanded to (Q_t). This greater quantity of production in the midst of the competitive forces is sure to reduce the product price (P_e to perhaps P_1) and erase the temporary excess profits (FL). The competition of the agricultural sectors generally prevents farmers from

protecting profit levels. To the extent that other sectors of the economy operate at less than competitive conditions, a divergence between their factor returns and family income compared to that of farm families is likely to persist. Although farm prices and income decline, consumers have benefitted from a larger supply of food at a lower price level.

One method historically used in farm commodity programs to increase farm prices and income is to reduce production. Acreage allotments, set-aside programs, diversion payments, and marketing quotas are policy instruments used to curtail production and, subsequently, increase farm prices and income. The factor of production whose use has been restricted is land, and it is relatively fixed in natural supply. As a result of this and other forces, land owners have bid up the price of land.

The major beneficiaries of any such one-time capitalization are the resource owners. Any time resources that are relatively inelastic in supply are restricted this kind of capitalization occurs (Floyd). Examples of beneficiaries of capitalization in the nonfarm sectors of the economy include holders of: urban capital, franchises, professional accreditation, and labor union membership.

In agriculture, ownership of land and product sales are skewed, with a small proportion of owners and operators producing a much larger proportion of the total product and income. Since most commodity price and income programs have been tied to either land or sales volume, their direct benefits have tended to be directly proportional to size and sales classes; that is, larger farmers get more benefits since they produce a larger volume (USDA-ESCS 1979; Gardner; Spitze, Ray, Walter and West).

Until the Agriculture and Consumer Protection Act of 1973, most agricultural price policies relied on parity as the base of comparison. Since its inception in the 1920s, parity has generated much emotional reaction, has proven highly controversial, and has been carefully codified into technical meanings. As a policy instrument, parity is that price for a unit of agricultural product that will currently give that unit the same purchasing power in the market for farmer purchased goods and services as it had in 1910-1914, adjusted for the relative price changes of that product compared to all farm products over the past ten years. Parity focuses on the purchasing power represented by price and not on volume of sales nor income (Holland; Sharples and Krenz). However, its aggregate concept, parity ratio, closely parallels the trends in total real net farm income.

As farm productivity has increased faster than that in the rest of the economy, as outmigration has reduced the number of farm families, and as off-farm income has increased, the parity ratio has become less useful as an indicator of the relative income of farm families. However, the parity concept is still widely accepted by many as a measure of equity for farm prices and income.

Cost of production has now largely replaced parity as the conceptual basis for calculating price supports. Cost of production is commodity specific and does reflect changes in technology and input use. Furthermore, it focuses on current economic changes and is similar to conceptual instruments that prevail in setting prices in the nonfarm economy.

Production costs vary widely from farm to farm and from one geographic region to the next. Climate, soil types, management skills, size of operation, and other factors all influence production costs. There are also conceptual problems in separating fixed and variable production costs (Martin; Pasour; Stovall and Hoover). Finally, any increased cost of production that is automatically built into prices through public policy, similar to any increase in price from the demand side, tends to be capitalized into the value of fixed factors of production such as land. Regional production costs could be used in establishing prices through policy, but even then the land values through capitalization would gradually adjust and reflect these regional cost and target price differences.

Farm income levels vary among regions, farms, and commodities. A multitude of policy instruments affect producers differently as to commodity, region, size, and firm organization. They also affect producers differently than consumers. More specifically, various farm policy instruments can have different impacts among livestock producers, crops producers, producers of export products, and producers facing import competition. The desired combination of policy instruments into a sound public policy package can be guided by theory but must be fashioned by the public policy process.

RECENT TREND DATA AND EMPIRICAL KNOWLEDGE

The data for the past two decades presented in the Statistical Appendix of this bulletin reveal quite clearly the characteristics of the price and income problems identified earlier in this chapter. They also substantiate the theoretical relationships just reviewed.

Prices received by farmers have varied throughout the period, with greatest instability since 1971. They have also oscillated more than prices paid by farmers for goods and services—primarily from the nonfarm sectors of the economy—more than consumer prices for food, and more than consumer prices paid for all items. Prices received by livestock producers have also been more unstable than those received by crops producers. The year-to-year variation appears related to yearly production variability and increasing dependence upon foreign markets.

Aggregate real net farm income has been highly variable, doubling from 1971 to 1973 and then dropping by 55 percent by 1976. This variability has been due largely to price instability rather than volume of sales. The off-farm component of farm family income has maintained a stable upward trend, leaving the income instability largely a result of the farm sources. Total per capita income of the farm population has gradually converged with that of the nonfarm population. Both the upward trend in real aggregate net farm income and its increasing instability appear associated with the increasing role of the export market.

Additional important trends relevant to the price and income problem are the increase in off-farm income, the increase in farm size, the increase in proportion of total sales from the larger farms, the increase in value of real physical assets, and the decrease in aggregate real value of government payments to farmers. No discernible relationship appears between the declining role in total net income from these government payments and farm productivity trends.

Numerous econometric studies have been conducted to analyze the various trends observed in farm prices and income over the last several decades. These studies help provide a deeper understanding of the fundamental behavioral relationships that underlie these trends.

Of particular importance are econometric estimates of price elasticities for the supply and demand for U.S. agriculture in the aggregate as well as for selected agricultural commodities. Various studies have verified the inelastic own-price and income elasticities of demand for most agricultural commodities (Brandow 1961; George and King; Nerlove and Addison; Tweeten).

One important new economic event that has influenced agricultural demand elasticities in recent years has been the growing importance of international trade, especially in U.S. agricultural exports. While there is some controversy about the exact magnitude of the

export demand elasticities for those agricultural commodities produced in the United States, it appears that the export demand elasticities are greater than one (Schuh); that is, a change in price would result in a proportionally greater change in quantity of exports. Consequently, while the domestic demand elasticities have likely become more inelastic, this trend has been partially offset by the growing importance of the export demand. However, the total demand for U.S. agricultural products is still quite price and income inelastic.

The price elasticity of supply for most crops produced in the United States is generally between 0.1 and 0.4. For some livestock products the own-price supply elasticities may be slightly larger but still normally less than one (Tomek and Robinson). Sharp swings occur in farm prices and income when there are unusual shifts in the supply and/or demand for agricultural commodities given their inelastic nature.

SELECTED FUTURE ALTERNATIVE POLICIES

Continuation of the 1977 Act

One policy alternative is the CONTINUATION of the basic policy provisions contained in the Food and Agriculture Act of 1977. This analysis emphasizes the commodity provisions of the current legislation (Johnson and Ericksen; Stucker; Penn and Boehm).

Provisions: A nonrecourse loan set approximately at or slightly below world market levels, at the discretion of the Secretary of Agriculture, would be available to eligible producers to provide price stability during the marketing year. The farmer-owned grain reserve program would provide a means of stabilizing farm prices over a three to five-year period. In times of excess supplies and lower prices eligible farmers could use the nonrecourse loans and place their grain in the reserve. As "free stocks" were reduced, market prices should rise. As market prices reach predetermined trigger levels, farmers could begin to sell grain from the reserve.²

To provide additional income protection to farmers against low market prices and induce their compliance with any production control needed, the target price/deficiency payment concept would be continued. Eligible farmers would receive a uniform deficiency pay-

ment per unit of production when the average market price fell below the target price. Target prices would be based on a two-year moving average of national production costs, excluding land purchase.³ Additional protection against natural disasters in crop production would be available either through continued disaster payments, an expanded national crop insurance, or a combination of the two.

Farmer eligibility for program benefits would continue to be based on participation in a set-aside program when the Secretary deems some reduction in production is necessary to achieve a balance between expected demand and supply. If no set-aside is in effect, all farmers would be eligible for program benefits.

Consequences: Continuing the 1977 Act would help stabilize grain prices while permitting farmers to retain some control over their marketing decisions. Prices would generally be stabilized at levels slightly higher than under no policy. This level would be between the loan level and the call price level except in a situation of unusually low grain production, e.g., an annual drop in U.S. production of over 15 percent, or world reduction of over 5 percent. The farmer-owned reserve with penalty provisions at the higher price levels minimizes the market impacts of government stocks being dumped suddenly or of producers holding grain indefinitely during periods of growing scarcity.

Farm income would generally be protected for crop producers from market prices falling below costs of production, other than land purchase costs, and from disaster due to natural catastrophe. Again, these income levels would average higher than no policy. As a result, the capitalization of this minimum income level into farmland prices would prevent them from falling as low as they otherwise would in the absence of public policy. The economic base of rural communities would be similarly protected.

A voluntary set-aside procedure gives farmers the flexibility to make resource allocation decisions according to efficient production criteria. The public experiences a balance between the supply and demand for its agricultural goods at a more desirable price level than would likely occur in the absence of such a public policy.

Treasury costs could be large, especially in periods of large crops. Low market prices would imply sizable deficiency payments to farmers plus the Treasury outlays associated with a nonrecourse loan/grain reserve program. This tax burden could range between minimal administrative costs in years of high farm product prices to

four to six billion 1972 dollars or 1 percent of the total federal budget in years of low product prices.

By keeping loan rates relatively low, growth in export sales and the U.S. share of foreign markets would be protected. A grain reserve program not only helps modify price variability but also assures foreign buyers of reliable supplies in the event of short falls in production and helps this nation to fulfill its foreign food aid commitments.

Compensatory payments

Another policy alternative would involve Treasury payments to farm producers when market prices fall below a predetermined target price level.

Provisions: This approach would set target prices for each commodity at a level that would result in farm income levels being no lower than the minimum allowed under alternative CONTINUATION. The target price would be set between the loan rate and target price level followed under that alternative. Farmers would be paid the difference between the target price and the average national market price for their volume of production. There would be no acreage set-aside, marketing quota, or other controls on production.

Consequences: A compensatory payment plan would encourage farmers to expand production above levels likely with no public policy and above those likely during low price periods under CONTINUATION. Farm product prices would likely vary more and fall lower in periods of low prices under this COMPENSATORY alternative than would occur under either CONTINUATION or no public policy. More resources would be held in the agricultural sector. Farm income would vary within a range similar to CONTINUATION and higher than the lowest levels under no policy.

Since this policy could be used for any product, the incomes of producers of livestock and other perishable products could be protected as well as crop farmers. Also, the rural community and agribusiness would receive economic protection. A reduction in risk due to the compensatory payments would likely lead to greater specialization. Similar to CONTINUATION, land prices would be held above the minimum likely with no policy.

Treasury outlays could be very high. This approach would be potentially more costly than alternative CONTINUATION. They

could range between minimal administrative costs and a high of 10 to 12 billion 1972 dollars or up to 2 percent of the federal budget in periods of large production and plentiful world grain stocks.

Agricultural exports would be encouraged during periods of large supply. This would help improve the balance of trade, pay for foreign imports, and strengthen the dollar, but it also could encourage retaliation from foreign competitors. Export sales would likely average higher than under either CONTINUATION or no policy.

Effective Production Control and Higher Price Support

A third possible policy for the farm price and income problem is to directly regulate the quantity produced and the price received—the CONTROL alternative. This approach could be accomplished through higher loan rates and effective production controls. Higher and more stable farm product prices and farm income would then be generated in the market at a level no less than that determined by the loan rate. Two options of effective production control are possible: compulsory, or voluntary.

Provisions of a Compulsory Option: Effective production control with the COMPULSORY option would require mandated compliance of all producers so that the aggregate quantity in any production cycle would clear the market at an average price high enough to provide a socially acceptable level of income for producers. To insure that the average price would not drop below this desired price level during the marketing year, a minimum price support through an annual nonrecourse loan would be available at that level.

Consequences of Compulsory Option: In order to ensure an average level and stability of farm income approximating that of the CONTINUATION and COMPENSATORY alternatives, stringent mandatory production restrictions would be available at all times and used periodically when large supply threatened the maintenance of the desired price level. Aggregate farm production, particularly crops, would likely be less than under CONTINUATION, and substantially less than under the COMPENSATORY alternative or no public policy. All producers would participate in the production balancing. Hence, there would be a reallocation of economic resources and adjustments in marketing decisions. As a result, farm product prices on the average would be slightly higher than under CONTIN-

UATION, and much higher than under COMPENSATORY. They would also average higher than under no public policy. Total farm income would be targeted to be comparable to the previous two alternatives, which would average higher and be more stable than in the absence of a public price and income policy.

Treasury costs would be higher than under no policy, but they would be lower than with the CONTINUATION alternative and substantially lower than under COMPENSATORY. There would be administrative costs to control and enforce the program. Also, there would be Treasury costs incurred for the annual issuance and redemption of the stabilizing nonrecourse loan program. The total costs should not exceed one-two billion 1972 dollars in any year.

Trade would be substantially disturbed by this policy, compared to the other policy alternatives, with the higher prices discouraging exports unless costly export subsidies were tendered. Import protective measures would be necessary to avoid a significant inflow of agricultural products. These policies could precipitate retaliation from both trading partners and competitors.

Provisions of a Voluntary Option: The objectives of the CONTROL alternative with the VOLUNTARY option are exactly the same as with the above COMPULSORY option. That is, regulating or balancing the aggregate quantity in any production cycle would clear the market at a socially desirable average market price to insure that the price and income would average higher and be more stable than in the absence of public policy. The important difference is that the production control would be achieved through the voluntary compliance of producers with sufficient volume to obtain the desired price. Inducements to comply would be some form of Treasury subsidies, probably either on a unit of product or on a unit of input, most likely land. This inducement could be varied to meet the degree and extent of participation needed for the production balancing. A minimum price support through an annual nonrecourse loan to stabilize the price during the marketing year would be available to program participants.

Consequences of Voluntary Option: The consequences to producers would very closely mirror those of the other option considered above with these differences: 1) slightly more acreages would be restricted to account for the slippage always associated with the voluntary approach as producers withhold their less productive resources, 2) slightly less production would be withheld and a slight-

ly lower average market price would be necessary to achieve the same farm income objectives since payments cover some fixed costs and eliminate the burden of some variable costs, and 3) producers would have the flexibility to pursue economic decisions in their allocation of resources and marketing decisions as they voluntarily chose whether to participate in the production control.

Treasury costs would be much higher than the **COMPULSORY** option because of the Treasury payments required in addition to the administration of the production control and nonrecourse loan programs. They would be only slightly lower than the **CONTINUATION** alternative where income supplementation is also involved. Outlays would still be lower compared with **COMPENSATORY**.

Trade would be affected similarly to the previous option, except that the marginally lower goal for the average market price would result in marginally less interference in normal trade.

Multi-Purpose Policy—An Innovative Alternative

A fourth alternative for the price and income problems of agriculture would depart from the traditional policy utilized since its inception in the late 1920s. This alternative encompasses additional agricultural problems that have recently emerged, and it would merge past policy instruments with new ones in response to broader public concerns. This policy alternative would be designed specifically to respond to three public problems: 1) balancing U. S. agricultural production with demand to maintain prices at publicly desired levels, and injecting a degree of price stability by means of "setting aside" productive land and by a grains reserve program, 2) conserving agricultural land against soil erosion, and 3) reducing pollution of waterways by nonpoint sediment sources from agricultural land to meet minimum levels established by Environmental Protection Agency guidelines to meet new public policy commitments.

Provisions: A national grains reserve policy, mirroring that under the **CONTINUATION** alternative, would be operated to provide an important part of the response to the problem of instability of farm prices and income. Also, the level of production would be programmed to insure market prices similar to those envisioned in the 1977 Act, or the **CONTINUATION** alternative.

A voluntary set-aside would be induced, through sufficient public payments, of land designated for its erosion-prone characteristics

(e.g., slope, proximity to stream, soil type, etc.). After a national goal of production set-aside is established, the total number of required set-aside acres would be allocated among the most erosion-prone acres.

Payments to land owners would be related to the productivity and erosiveness of their land. Because of either its location (close to a stream) or its quality (slope or structure), land with the highest erosiveness might need to be set aside almost continuously to meet minimum national sediment control standards. Additional payments could be made to keep this land out of production or to help farmers make the necessary investments to reduce soil erosion. Flexibility would be permitted for most managerial economic decisions of resource allocation and marketing, except that sufficient inducements would counteract what would otherwise be the private economic decision to produce on land that would result in erosion and sedimentation not in the public interest.

A combination of the slightly altered prices and substantial payments would assure an income level similar to that envisioned under CONTINUATION. The aggregate payments would exceed those of the latter because of the need to induce set-aside of larger acreages of some farms, thereby essentially destroying their economic viability, and because of the need to set aside larger acreages of relatively lower producing land to attain the desired production control objectives.

Export and import controls would be minimal, similar to CONTINUATION, but sufficient to prevent significant decreases in the former or increases in the latter.

A national agency such as the Soil Conservation Service would be needed to provide the expertise required to establish and evaluate the desired conservation and nonpoint sedimentation objectives.

Consequences: Average levels and stability of both farm product prices and farm income would be generally parallel to those achieved under the CONTINUATION alternative. The primary differences at the producer level would be the concentration of both the production control and the changes in resource use in the crop areas with most erodible land, or generally marginal production regions. This situation contrasts with production control being pursued throughout a type of farming area under either the CONTINUATION or CONTROL alternative. It would mean that some land and associated resources would shift out of agricultural production or into alternative enterprises as the owners of those resources respond

to the policy inducements. Adjacent rural communities would experience a declining economic base, an occurrence that could be mitigated by recreational use and grazing of some of the diverted land.

Consumer food prices and quantity would be quite similar to those associated with CONTINUATION in terms of a planning horizon of a generation, but could be more favorable in a longer term societal horizon as some resources are conserved for future generations.

The effects on trade would be identical to those of CONTINUATION. Treasury costs primarily for inducement payments, but also for a more elaborate administrative system to serve the multiple objective, would greatly exceed those of no public policy, CONTROL, and even the CONTINUATION alternative, approaching the high costs of the COMPENSATORY approach. However, unlike the other costly alternatives, the public transfer payments would serve to alleviate not only the price and income problems of farmers, but also the public problems of erosion of productive land resources and the nonpoint sedimentation of the public's waterways. Then, too, the costs of specific programs otherwise necessary to alleviate those problems might be reduced or even avoided by this policy alternative. Finally, externality costs of prevented soil erosion and deterioration of rivers, lakes, and water structures could logically be perceived as offsetting the high Treasury outlays.

NOTES

1. For excellent chronological and analytical overviews of these policies, see Brandow (1977), and Rasmussen and Baker.
2. The evidence is not clear whether farmers have released grain from the reserve in the best interest of the public. Several trigger prices could be used to smooth the release. One alternative would be a gradual reduction in storage payments as market prices move above the release price. Another could be three trigger prices: 1) a release price, 2) a price where storage payments would be stopped, and 3) a call level.
3. To alleviate the fluctuations in target prices due to sharp annual changes in yields, a trend yield over several years could be used instead of the actual yield to calculate the cost of production per unit of output.

REFERENCES

- Brandow, G.E. *Interrelations among Demands for Farm Products and Implications for Control of Market Supply*. Pennsylvania State University Agr. Exp. Sta. Bull. 680, 1961.

- Brandow, G.E. "Policy for Commercial Agriculture, 1945-71" in *A Survey of Agricultural Economics Literature, Volume I*. Lee R. Martin, ed. Minneapolis: University of Minnesota Press, 1977.
- Cochrane, W.W. *Farm Prices: Myth and Reality*. Minneapolis: University of Minnesota Press, 1958.
- Floyd, J.E. "The Effects of Farm Price Supports on the Returns to Land and Labor in Agriculture." *J. Polit. Econ.* 73(1965):148-158.
- Gardner, B.L. "Public Policy and the Control of Agricultural Production." *Amer. J. Agr. Econ.* 60(1978):836-43.
- George, P.S. and G.A. King. *Consumer Demand for Food Commodities in the United States with Projections for 1980*. University of California Giannini Foundation Monograph 26, 1971.
- Holland, Forrest. "The Concept and Use of Parity in Agricultural Price and Income Policy." *Agricultural-Food Policy Review*. USDA-ERS AFPR-1, Jan., 1977, pp. 54-61.
- Houck, J.P. "Some Economic Aspects of Agricultural Regulation and Stabilization." *Amer. J. Agr. Econ.* 56(1974): 113-24.
- Johnson, G.L. "Supply Function—Some Facts and Notations." in *Agricultural Adjustment Problems in a Growing Economy*. Ames: Iowa State University Press, 1958.
- Johnson, James and Milton Ericksen. *Commodity Program Provisions under the Food and Agricultural Act of 1977*. USDA-ERS Agr. Econ. Rep. 389, 1977.
- Martin, Marshall A. *Cost of Production: The Concept and Some Implications for Its Use in the Determination of Target Prices and Loan Rates*. Purdue Agr. Exp. Sta. Bull. 162, 1977.
- Nerlove, Marc and William Addison. "Statistical Estimation of Long-Run Elasticities of Supply and Demand." *J. Farm Econ.* 40(1958):861-880.
- Pasour, Jr. E.C. "Cost of Production: A Defensible Basis for Agricultural Price Supports?" *Amer. J. Agr. Econ.* 62(1980):244-48.
- Penn, J.B. and William T. Boehm. *Research Issues Reemphasized by 1977 Food Policy Legislation*. USDA-ESCS 10, 1978.
- Rasmussen, Wayne D. and Gladys L. Baker. *Price Support and Adjustment Programs from 1933 through 1978: A Short History*. USDA-ESCS, Agr. Inf. Bull. 424, 1979.
- Robinson, K.L. "Unstable Farm Prices: Economic Consequences and Policy Options." *Amer. J. Agr. Econ.* 57(1975):769-77.
- Schuh, G. Edward. "The New Macro-economics of Agriculture." *Amer. J. Agr. Econ.* 58(1976):802-811.
- Sharples, Jerry A. and Ronald Krenz. "Cost of Production: A Replacement for Parity?" *Agricultural-Food Policy Review*. USDA-ERS AFPR-1, Jan. 1977, pp. 62-68.
- Spitze, R.G.F., D.E. Ray, A.S. Walter, and J.G. West. *Public Agricultural-Food Policies and Small Farms*. Washington, D.C.: National Rural Center (in publication).

- Stovall, John G. and Dale Hoover. "An Overview of the Cost of Production-Uses, Concepts Problems, and Issues." *Estimating Agricultural Costs of Production-Workshop Proceedings*. USDA-ESCS 76, 1979, pp. 3-11.
- Stucker, Thomas A. and William T. Boehm. *A Guide to Understanding the 1977 Food and Agricultural Legislation*. USDA-ECS Agr. Econ. Rep. 411, 1978.
- Tomek, William G. and Kenneth L. Robinson. *Agricultural Product Prices*. Ithaca: Cornell University Press, 1972.
- Tweeten, Luther. *Foundations of Farm Policy*. Lincoln: University of Nebraska Press, Second Edition, 1979.
- USDA-ESCS. *Status of the Family Farm: Second Annual Report to Congress*. ESCS Agr. Econ. 434, 1979.

3 AGRICULTURAL POLICY AND FOOD PRICES

M.C. Hallberg and T.A. Stucker

POLICY PROBLEM

The food price increases and fluctuations of the 1970s have been a major concern to U.S. consumers. This concern has forced policy makers to focus more sharply than probably at any time since World War II on the general issue of food price instability and on the process by which food prices are determined.

In the U.S. economy resources are allocated among alternative uses primarily by relative prices. Changes in relative prices over time are to be expected in response to changes in natural, technological, and behavioral forces. Such price changes are not typically violent; when they are violent, their effectiveness in guiding economic choices tends to be impaired. Farmers, for example, have long sought stable product prices in an effort to reduce the uncertainty that makes production planning more difficult and more costly. Similarly, consumers seek stable food prices in an effort to simplify and make less costly the optimal budgeting of household expenditures. Rapidly fluctuating food prices may, for example, lead to *ad hoc* purchase decisions as substitutions are made within and among food categories, and as the portions of the budget spent on food and nonfood are altered.

A second facet of the current policy problem is that prices of food, like prices of other goods and services, are moving upward but at differing rates. These changes are putting added pressure on household decision makers regarding food purchases. Further, the

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changes have different impacts on different groups of consumers. The purchasing power of the poor in particular is severely reduced. The issues analyzed, then, concern what factors and policy actions affect the rate of change of food prices and in what direction. The purpose of this chapter is to examine these issues by considering the interrelations between the farming, marketing, and retailing sectors by studying recent trends in food prices and by examining the impact of selected policy alternatives on food prices and consumption.

THEORETICAL FOUNDATIONS

To understand and predict the nature of food price levels and fluctuations it is helpful to conceptualize the underlying forces at work. The basic raw material for food is, of course, provided by the agricultural sector. This sector is extremely complex and difficult to unravel. There are lagged responses to price changes induced by biological constraints. These lagged responses in turn bring about price and production cycles. Uncertainties and abrupt changes are associated with weather and disease. Key interactions exist between feed grain and livestock production. Finally there are significant interrelations between the agricultural sector, the marketing sector, and the consumer sector. This chapter is now directed to the essential character of the feed grain and livestock economy and to some of the intersector interactions noted above.

Grain-Livestock Economy

Agricultural policy in the post World War II years has been directed primarily at crops, including in particular wheat and feed grains. Hence, this policy has had a direct impact on retail prices of food made from these products—as well as an impact on the producers. But since a substantial portion of these grains are fed to livestock (45 percent in 1977), the policies have also had an indirect impact on the retail prices of beef, hogs, sheep, poultry, eggs, and milk—as well as an impact on the producers of these products.

Robinson calculated the following direct and indirect impacts on U.S. consumers for all domestic grain use. These results are expressed in 1973-1974 dollars per capita. The calculations assume grain price increases of approximately \$1 per bushel. These estimates assume an

instantaneous and full adjustment of prices of foods made from grain (the direct impacts) and of prices of meat, poultry, and dairy products (the indirect impacts). While instantaneous adjustment is not likely in the real world, we would expect full adjustment to occur over the long run.

Table 2. Annual Consumer Cost of One Dollar Grain Price Increase

	Direct	Indirect through Livestock	Total
Wheat	\$3.00	\$ 0.80	\$ 3.80
Feed Grains	2.68	29.00	31.68
Soybeans	2.04	2.62	4.66
	<u>\$7.72</u>	<u>\$32.42</u>	<u>\$40.14</u>

Source: Robinson

Clearly, the indirect impacts of agricultural policy aimed at grain prices or production must not be ignored. The total effect on the consumer through livestock is almost six times larger than the direct impacts alone. This relationship suggests that livestock producers, as well as consumers, have an interest in any policy that affects grain prices.

Marketing Margins, Farm Prices, and Retail Prices

The primary or retail demand for food products is a joint demand for the farm-based and marketing-based (marketing service) components of these products. Hence the demand for the farm-based components of food products is derived from the retail demand. Derived demand can be obtained by appropriately accounting for the costs of marketing services added to the farm produce. These costs are designated collectively as the marketing margin.

A hypothetical primary demand schedule (D_r) and derived demand schedule (D_f) are shown in Figure 2. It is assumed that the supply of marketing services is perfectly elastic, so the marketing margin (MM), defined as the difference between the retail price of the commodity and the farm price of the farm produce used, is constant at all levels of quantity demanded.

By a similar line of reasoning, retail supply is a joint supply of the farm-based and marketing-based components of food products.

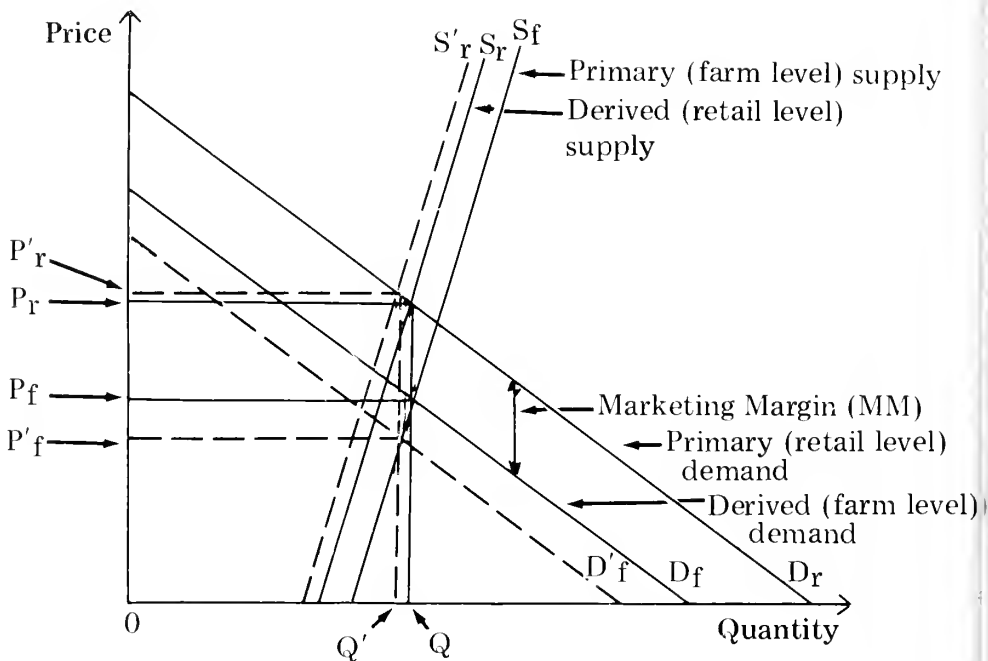


Figure 2. Equilibrium Prices at Farm and Retail Levels.

Retail supply can thus be considered derived from farm supply. A diagrammatic farm-level supply schedule (S_f) and a derived retail-level supply schedule (S_r) are also shown.

These theoretical relationships provide the necessary framework for studying the impact of marketing margin changes on farm and retail prices (Freeman). Equilibrium farm price (P_f) is given by the intersection of derived demand and primary supply, and equilibrium retail price (P_r) is given by the intersection of primary demand and derived supply. An increase in the marketing margin, which would be reflected in a downward shift of the derived demand schedule (D'_f) and in a leftward shift of the derived supply schedule (S'_r), would result in an increase in retail price (P'_r), a decrease in the farm price (P'_f), and in a decrease in quantity consumed (Q'). A decrease in the marketing margin would have the opposite effect.

Note in Figure 2 that when marketing margins change, the entire amount of the change can not be expected to be reflected in the retail price, except in the unlikely case of a horizontal supply curve. On the other hand, when supply is perfectly inelastic, which is a

fairly reasonable assumption for agriculture in the short run, the entire burden of an increase in the marketing margin can be expected to fall on farmers' prices. In general, the incidence of changes in the marketing margin is seen to be dependent upon the relative slopes of the demand and supply curves. Since supply of farm products is generally considered more price inelastic than demand in the short run, the incidence of a given change in the marketing margin can be expected to be greater at the farm than at the retail level (Tomek and Robinson).

Some cautions with this theoretical framework should be observed. First, the above analysis is predicated on the assumption that marketing margin increases or decreases are due to increases or decreases in the cost of providing a given bundle of marketing services. If marketing margins change because the quantity and/or quality of marketing services change, the primary or retail-level demand function can be expected to shift since the primary demand function is a joint demand for the farm product and the marketing services. The most recent attempt to estimate the quantity of marketing services used data from 1929 to 1962 (Waldorf). The trends observed in Waldorf's work, irrespective of its date, are consistent with the currently held view that, with increased affluence, more working wives, etc., consumers are now demanding and receiving more marketing services. The effect of this trend has most likely been an upward (to the right) shift in the primary demand curve with little or no impact on the position of the derived demand curve and hence on farm prices. There have, however, been changes in costs of providing a given and constant bundle of marketing services in recent years, so the position of the derived demand curve has shifted, and hence the level of farm as well as retail prices has been impacted.

Second, the above analysis also assumes that marketing agents are perfectly competitive, that there are no lags in the transmission of price changes at different levels of the producing-processing-marketing chain, and that there are no economies or diseconomies of scale in marketing. Recent research raises questions about these assumptions. The work of Parker and Connor, for example, points strongly to the existence of noncompetitive behavior in food manufacture and provides estimates of the consumer costs of monopoly excesses. Recent evidence also suggests that marketing margins respond to changes in farm prices with some lag (Heien, Benson, Parham). Although this is a short-run phenomenon, its effect accumulates. Hence, the impact of a large price increase at the farm level in one year, such as occurred in 1973, is not fully transmitted

through the system until at least the subsequent year. Finally, evidence exists that marketing margins for some commodities vary with volume marketed (Buse and Brandow). Recent results confirming this behavior are discussed later.

One final limitation of the analysis is its partial-equilibrium framework. It does not consider substitutions or complementarities among commodities on either the demand or the supply side. It also ignores interrelations with the rest of the economy and with the rest of the world.

FOOD PRICE TRENDS AND RELEVANT EMPIRICAL KNOWLEDGE

Food Prices and Inflation

Estimates of the contribution of retail food price increases to inflation over the 1960-1979 period are presented in Table 3. These estimates mask some important factors such as the contribution of individual food items, the increasing importance of away-from-home eating, and the recent volatility of prices of imported foods and fish. Nevertheless, the data suggest that, with the exception of 1973 when farm prices increased by 43 percent, food has been no greater a contributor to inflation during the turbulent 1970s than it was during the relatively tranquil 1960s.

Price increases at the farm level contribute much less to inflation than do increases in the marketing margins for food items (Table 4). Although food items constitute about 18 percent of the Consumer Price Index (CPI), the farm value of these food items accounts for only about 6 percent of the CPI. The remaining 12 percent of food's contribution is accounted for by the marketing sector. Thus it is clear, as Robinson has observed, that what happens in the food marketing sector is likely to have more impact on inflation than policy changes affecting farm prices.

Variability of Farm and Food Prices

Retail prices, farm values, and marketing margins for food products were decidedly more volatile in the late 1960s and in the 1970s than in the early 1960s (Statistical Appendix Tables 6, 7, 18, 19, 20).

Table 3. Contribution of Food Prices to Inflation

	Percentage Change in CPI for All Items	Percentage Change in CPI for Food	Percentage Increase in CPI for All Items Accounted for by Food ^a
	(percent)	(percent)	(percent)
1960	1.6	1.0	21.2
1961	1.0	1.3	40.3
1962	1.1	0.9	26.4
1963	1.2	1.4	26.0
1964	1.3	1.3	22.0
1965	1.7	2.2	27.5
1966	2.9	5.0	40.0
1967	2.9	0.9	7.4
1968	4.2	3.6	19.8
1969	5.4	5.1	21.8
1970	5.9	5.5	21.2
1971	4.3	3.0	16.1
1972	3.3	4.3	29.3
1973	6.2	14.5	52.8
1974	11.0	14.4	32.0
1975	9.1	8.5	23.3
1976	5.8	3.1	13.4
1977	6.5	6.3	29.1
1978	7.6	10.0	24.9
1979 ^b	10.1	10.4	19.9

^aChange in CPI for food times food's relative weight in the CPI for all items divided by the change in CPI for all items.

^bEstimation based on January through October data.

Source: Salathe and Boehm, p. 6.

Table 4. Relative Importance of Food Items at the Retail and Farm Levels on the Consumer Price Index for All Commodities, 1978

Component	Relative Importance		Farmers' Share of Retail Value ^b	Relative Importance at Farm ^c
	at Retail ^a	percent		
All Food Items	18.16	33.4 ^e		6.07 ^e
Food Consumed at Home	12.62	39.3		4.96
Cereal & Bakery Products	1.54	14.1		0.22
Meat, Poultry, & Fish	4.36	58.6		2.55
Dairy Products	1.68	51.3		0.86
Fruits & Vegetables	1.76	24.6		0.43
Sugars & Sweetens	0.44	50.0 ^f		0.22
Fats & Oils	0.37	34.1		0.13
Nonalcoholic Beverages	1.42	28.0 ^e		0.40 ^e
All Other	1.05	14.0		0.15
Food Consumed Away from Home	5.55	20.0 ^d		1.11

^aWeight in CPI, all items (1967 = 100). (Bureau of Labor Statistics.)^bBased on USDA market basket of farm foods. (USDA-ESCS.)^cColumn 1 times column 2 divided by 100.^d1977 estimate. (*National Food Situation*.)^eEstimated as a residual.^fEstimated from data in *Sugar and Sweetener Situation* on beet and cane sugar. This is probably an over-estimate of the farmer's share for sugars and sweets.

Typically, farm values of food exhibit greater variability than do retail prices of food. The volatility of marketing margins for most foods is comparable to that of retail prices. Notable exceptions to this rule are found with broilers, eggs, and fats and oils.

Contrary to some expectations, the above food price variations did not result in compensating adjustments in per capita consumption (and hence an increased variability of per capita consumption of food products) during the 1970s. There have, however, certainly been changes in per capita consumption since the early 1960s. Per capita consumption of eggs, pork, dairy products, coffee, veal, and mutton has declined noticeably, while that of broilers, beef, fruit, and vegetables has increased. Nevertheless, the coefficients of variation computed for annual per capita consumption were remarkably stable over the entire 1960-1977 period.

Marketing Margins, Food Prices, and Farm Prices: A Model

To provide more specific detail on the market relationships, an empirical model of the food and agricultural sector is useful. To provide some indication of the magnitudes of the impacts of a few relevant exogenous variables on farm and retail prices, adaptations were made in a basic and simplified feed-livestock model developed by Prindle. Other quantitative models do not include all of the interrelationships of relevance to this topic.

The Prindle model was designed to estimate: equilibrium prices and quantities of beef, veal, pork, mutton, broilers, turkeys, eggs, and milk; equilibrium numbers of beef cattle placed in feedlots; and equilibrium prices of corn and soybean meal. Exogenous variables of the model included the quantity of high- and low-protein feeds available for livestock consumption, disposable income of consumers, and imports of each of the meats. The equations of the model included demand for low- and high-protein feed, livestock-grain price equilibrium or animal product supply relations, derived demand relations for each of the meats, for eggs, and for milk, and appropriate accounting identities. The model was estimated from annual data over the period 1961-1971 and utilized to make simulations for the 1967-1971 base period.

In adapting the Prindle model for use here, the derived demand relations were replaced with primary demand functions (obtained

from George and King), marketing margin relations were added¹, and all remaining relations were updated to the 1977 base period.

Thus modified, the model not only produces equilibrium farm prices, but also equilibrium retail prices of meats, eggs, and dairy products. It recognizes substitutions on both the demand and supply side and accounts for the relevant interactions between the farming and marketing sectors. It can be interpreted as a reasonable quantitative representation of the major economic relationships at work in the feed grain and livestock portion of the farm and food sector of importance here.

Only a few selected relations of the model will be noted. Marketing margins for some products do vary with quantity marketed. Marketing margins for pork were found to be negatively related to the quantity of pork processed, while marketing margins for eggs were found to be positively related to the quantity of eggs marketed. The pork results suggest that there exist economies of scale in the provision of pork marketing services. The egg results are less easily explained, but they seem to imply that egg marketers raise and lower the marketing margin in an effort to moderate retail price fluctuations.

The numerical results from the solution of the model confirm some of the theoretical relations discussed earlier (Table 5). The results support the theory that as marketing costs increase, farm prices fall and retail prices rise. There are exceptions to this rule, e.g., the impact of wage rate increases on retail prices of turkeys, eggs, and dairy products. This exception can be explained by the substitution effects on the demand side outweighing the effects of increased wages on the retail prices of certain products.

The magnitudes of the coefficients in the table also indicate that a reduction in the costs of marketing and processing, i.e., in the marketing margin, will likely be accompanied by fairly large reductions in food prices and increases in farm product prices. Wage rate reductions appear to have a greater impact on farm and retail prices than do reductions in other marketing costs. Nevertheless, policies directed at reducing nonwage marketing costs can also be expected to have important payoffs to both consumers and farmers.

Finally, the coefficients also confirm that impacts of shifts in the derived demand curve are generally greater on farm prices than on retail prices (note in particular column 2). This same phenomenon takes place as the primary demand curve shifts due to increases in disposable income (column 1).

Table 5. Responsiveness of Farm and Retail Prices to Changes in Selected Exogenous Variables^a

Percentage Change in Farm and Retail Prices in Response to a One Percent Increase in:					
	Per Capita Disposable Income	Wage Rates	Other Marketing Costs for		
			Beef	Pork	Fresh Milk
.....percent.....					
Farm Prices					
Soybean meal	1.51	-0.55	-0.15	-0.20	-0.01
Corn	1.58	-0.67	-0.19	-0.22	-0.01
Beef	1.02	-0.59	-0.34	0.05	0.00
Veal	1.84	-1.56	-0.03	0.21	0.00
Pork	0.70	-0.29	-0.08	-0.10	0.00
Lamb	0.86	-0.77	-0.03	0.29	0.00
Broilers	1.37	-0.55	0.15	-0.19	-0.01
Turkeys	0.90	-0.36	-0.10	-0.12	0.00
Eggs	0.73	-0.30	-0.09	-0.10	0.00
Milk	1.03	-0.22	-0.07	-0.07	-0.06
Retail Prices					
Beef	0.68	0.08	0.36	0.04	0.00
Veal	0.58	0.11	-0.01	0.07	0.00
Pork	0.23	0.27	-0.04	0.48	0.00
Mutton	0.50	0.16	-0.02	0.17	0.00
Broilers	0.28	0.59	-0.03	-0.04	0.00
Turkeys	0.44	-0.18	-0.05	-0.06	0.00
Eggs	0.58	-0.02	-0.07	-0.07	0.00
Fluid milk	-0.80	0.17	-0.05	-0.06	0.18
Butter	0.62	-0.13	-0.04	-0.05	-0.04
Cheese	0.97	-0.21	-0.06	-0.07	-0.06
Evaporated milk	1.27	-0.28	-0.08	-0.09	-0.07
Frozen products	1.14	-0.25	-0.07	-0.08	-0.07

^aAll prices, income, wages, and costs are deflated by Consumer Price Index.

CONSEQUENCES OF POLICY ALTERNATIVES

Continuation of the 1977 Act

Because of the price support and production control features of the 1977 Act, retail prices of grain products can be expected to be somewhat higher under this CONTINUATION alternative than if no program existed. Since feed grain prices are maintained above equilibrium levels, farm and retail prices for livestock products would be higher than under no program. This in turn means that per capita consumption of these products is reduced, and the nutritional intake of some consumers is reduced. The relative increase in food prices associated with this policy would be greater under conditions of heavy supplies, e.g., exceptionally favorable weather, as production controls come into play. Fluctuations about a likely upward trend in food prices due to rising production costs, however, should not exceed levels observed during the last half of the 1970s, due in large part to the grain reserve features. There should be less price variability than under no program.

Finally, this program will continue to serve the low income consumers better than would occur in the absence of the food subsidization provisions of the 1977 Act.

Treasury costs of this program are not exorbitant, nor are they insignificant. They would be higher in periods of heavy supplies. In 1978 government payments to farmers amounted to \$13.86 per U.S. resident, i.e., 1.2 percent of per capita consumption expenditures on food. Total government cost of implementing all provisions of the 1977 Act was probably twice this amount. These costs are, of course, borne by federal taxpaying farmers as well as by taxpaying consumers. Given that only about 4 percent of the population in the United States live on farms, there was in 1978 an important transfer of income from nonfarm people to farm people, amounting to over 1 percent of total federal expenditures, in order to implement the food and agricultural policies of the 1977 Act.

Compensatory Payments

Under this alternative, farm prices would be permitted to seek their equilibrium levels, which would be, on average, lower than under CONTINUATION and lower than even under no policy.

Consumers would thus enjoy lower prices and greater consumption of cereals, meat, eggs, and dairy products. Low income families would have access to a more nutritious diet for the same total outlay for food.

Consumers may also be expected to benefit from the COMPENSATORY alternative in that lower prices of agricultural products would permit freer movement of agricultural products in international trade. Freer trade could result, for instance, in a substantial reduction in import controls on red meat, dairy products, and poultry products. Such reductions may, in turn, provide the United States greater leverage in negotiating for freer trade of industrial products attractive to U.S. consumers.

It is likely that food prices would be somewhat more unstable under this alternative than under CONTINUATION because of the absence of any price stabilization mechanism. It would take dramatic natural phenomena, however, to induce price variations of the magnitude observed in the early 1970s.

The Treasury costs of implementing this policy alternative would likely be higher than those associated with the CONTINUATION alternative. This is particularly true if the policy provides for supporting the incomes of livestock and fresh fruit and vegetable producers as well as the income of grain producers. Thus, there would be offsetting costs to federal taxpaying consumers. It is doubtful, however, that the added Treasury costs would outweigh the consumer benefits mentioned above, particularly to those with lower incomes.

Since this alternative would permit direct support of the incomes of livestock and poultry producers, it would encourage expansion of these sectors. These sectors would likely experience increased demand as incomes rise (Sisler). The COMPENSATORY alternative also should add more stability to these sectors than would exist in the absence of any policy.

Effective Production Control and Higher Price Support

The use of either compulsory or voluntary production controls gives policy makers more leverage in achieving farm price and income goals at lower Treasury cost than under the previous two alternatives. Nevertheless, the CONTROL alternative means higher market prices for farm products and thus higher food prices than would exist under the CONTINUATION or COMPENSATORY alternative.

For the reasons indicated in the earlier section on the grain-livestock economy, the retail cost of livestock and poultry products will be significantly enhanced under this alternative. Let us assume, for example, that feed grain prices are increased by 50 cents per bushel under this alternative. This increase in farm prices could be expected to result in an annual increase (in 1973-1974 prices) in consumer expenditures of \$1.34 per capita through purchases of food products made from feed grains and of \$14.50 per capita through purchases of livestock and poultry products.

Low income consumers are likely to be most seriously disadvantaged by the CONTROL alternative as a result of the higher cost of food and particularly of the higher cost of livestock and poultry products. Some of the pressure on this class of consumers would be relieved, however, if a food subsidization provision were made. Retail prices of grain products could be expected to be somewhat more stable under this alternative than under either the CONTINUATION or COMPENSATORY alternative. The variability of retail prices of livestock and poultry products would also be more stable.

In contrast to the expected results of the COMPENSATORY alternative, consumers can also be expected to be disadvantaged from the added restrictions on movement of agricultural products in international trade. The Treasury cost of CONTROL would likely be lower than that of the previous two alternatives.

Payments and Workable Competition—An Innovative Alternative

This alternative encompasses all of the features of the COMPENSATORY alternative. In addition, it provides for the institution of means designed to enhance workable competition and to reduce excessive costs in the food marketing sector. The latter might take the form of a professionally staffed federal public commission empowered to: 1) monitor the food industry for monopoly excesses and incidences of unworkable competition, 2) subpoena information needed and to conduct or commission basic and applied research relevant to changing the structure of the food industry, and 3) recommend actions designed to counteract or limit excessive or misleading advertising, to restrict mergers, to discourage firm growth, to encourage firm entry (both corporate and cooperative), and to eliminate regulations that are unnecessarily restrictive or that encourage inefficiencies.

The "workable competition" portion of this policy alternative could, of course, be combined with CONTINUATION or CONTROL.

It was combined with the COMPENSATORY alternative here because the latter also emphasizes "free market" operations.

The policy alternative conceived here could serve a variety of objectives in addition to that of lowering the cost of food to consumers. These include: 1) serving the equity goal of supporting the incomes of livestock and poultry producers as well as of grain producers, 2) eliminating monopoly excesses or government regulations in food marketing that do not promote efficiency, 3) assisting in providing farmers full access to better performing markets, and 4) more fully integrating farm and food issues into national food and agricultural legislation.

The commodity policy objectives of this alternative would result in all of the consequences of the COMPENSATORY alternative. Eliminating possible "monopoly excesses" in food marketing means lower marketing margins. As previously shown, lower marketing margins can, in general, be expected to be accompanied by lower retail prices and higher farm prices. Parker and Connor estimate that "monopoly excesses" in food processing amounted to 5-6 percent of food consumption expenditures in 1975. If even one-half of this estimate could be eliminated by the means suggested, significant impacts on food prices could be expected. Quite importantly, greater impacts on retail prices could be obtained from these savings than from comparable percentage reductions in farm prices brought about by policy actions.

Encouraging entry of marketing and processing firms, perhaps along with divestiture of some existing marketing and processing firms, would be expected also to locate markets in certain areas of the country currently disadvantaged by having no markets or inadequately performing markets. If these new markets prevented costly long-distance shipment of food products, marketing margins would be lowered, thus benefiting consumers as well as producers.

NOTES

1. The marketing margin relations used were of the form:

$$P_r = a + b_1W + b_2Q + b_3T + b_4P_f$$

where P_r = retail price

W = wage rate index

Q = quantity of product marketed

T = time

P_f = farm price

In these relations Q produced a coefficient that was significantly different from zero only for pork and eggs; W produced a coefficient that was significantly different from zero in beef, veal, pork, mutton, broilers, and eggs; and T produced a coefficient that was significantly different from zero and negative for beef, mutton, eggs, evaporated milk, and frozen products but positive for turkeys and cheese.

REFERENCES

- Benson, Geoffrey A. "The Dynamic Analysis of the Price Behavior of Farm and Retail Prices for Selected Food Commodities." Ph.D. thesis, Pennsylvania State University, 1979.
- Buse, R.C. and G.E. Brandow. "The Relationship of Volume, Price and Costs to Marketing Margins for Farm Foods." *J. Farm Econ.* 42(1960): 362-370.
- Freeman, R.E. "Roles of Farm Productivity and Marketing Margins in Postwar Decline in Farm Prices." *J. Farm Econ.* 48(1966): 31-41.
- George, P.S. and G.A. King. *Consumer Demand for Food Commodities in the United States with Projections to 1980*. California Agr. Exp. Sta. Giannini Foundation Monograph 26, 1971.
- Hein, Dale. *A Study of the Relationship between Farm-Level Prices and Retail Food Price*. Report Prepared for the U.S. Council on Wage and Price Stability, Sept., 1976.
- Parham, Karen D. *Weekly Wholesale and Retail Marketing Margins for Choice Beef and Pork*. M.S. thesis, Pennsylvania State University, 1979.
- Parker, R.C. and J.M. Connor. "Estimates of Consumer Loss Due to Monopoly in the U.S. Food-Manufacturing Industries." *Amer. J. Agr. Econ.* 6(1979): 626-639.
- Prindle, Allen M. "A Static Equilibrium Model of the U.S. Feed-Livestock Sector." Ph.D. thesis, Pennsylvania State University, 1977.
- Robinson, K.L. "Unstable Farm Prices: Economic Consequences and Policy Options." *Amer. J. Agr. Econ.* 57(1975): 769-777.
- Salathe, L.E. and W.T. Boehm. *Food Prices in Perspective*. USDA-ESCS Agr. Inf. Bull. 427, July 1979.
- Sisler, D.G. *Direct Payments as a Policy Tool in the Feed Grain Livestock Sector*. Cornell Agr. Exp. Sta. Bull. 1011, Oct. 1966.
- Tomek, W.G. and K.R. Robinson. *Agricultural Product Prices*. Ithaca: Cornell University Press, 1972.
- Waldorf, William H. "The Demand for and Supply of Food Marketing Services: An Aggregate View." *J. Farm Econ.* 48(1966): 42-60.

4 AGRICULTURAL TRADE POLICY ISSUES

Alex F. McCalla

The importance of the international market to the U.S. agricultural sector increased substantially in the 1970s. This increase is vividly portrayed by the growth of net agricultural trade as a percent of gross farm income from 3 percent in the early 1960s to 12 percent in the late 1970s. There is every indication that agricultural trade will be as important, if not more so, in the 1980s. Thus, trade policy issues will be important in the formulation of food and agricultural legislation in 1981 and beyond. In this chapter the nature of the public policy issues related to agricultural trade are outlined. Analyses of interfaces between domestic policy and the international market are often difficult because of inadequacies in the theoretical and empirical models. These issues are reviewed before a discussion of a limited set of public policy alternatives is presented.

PUBLIC POLICY PROBLEM

Most countries pursue price and income policies to protect domestic agriculture from instability and to provide minimum income maintenance. The United States is no exception. For more than 40 years the United States has accumulated an increasingly complex set of price and income policy measures to serve these purposes for the agricultural sector. The pursuit of domestic support policies is much more complex when there is more than a marginal involvement in international markets. This is so because some management of

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the international interface is necessary to prevent events in international markets from overturning domestic objectives. The issue becomes even more complex if the nation is both an exporter and an importer.

On one hand, a developed country exporter seeks to expand or at least maintain exports. As a result, farm income is enhanced in the face of nearly static domestic demand and rising farm costs. This leads the United States, when wearing an exporter hat (grains, oilseeds, and some fruits and vegetables), to adopt a "freer trade" stance on these commodities to expand export opportunities. Similarly, the United States takes a free trade stance on commodities it does not produce (e.g., tropical beverages, spices, and other assorted tropical products).

However, there are other circumstances in which the United States is either both an exporter and importer (e.g., cotton, tobacco, wine, and processed fruits and vegetables) or an importer (e.g., dairy products, beef, sugar) where management of competitive imports is necessary to prevent disruption of domestic programs. This situation leads to an essentially "protectionist" position on these commodities. These various policy positions lead the United States into a neomercantilist stance of simultaneously seeking to expand exports and manage imports.

Thus, the first major policy problem is clear. Trade dramatizes the often inconsistent objectives of a nation as it tries to implement complex domestic policies in the international context. This is not a new problem, nor is it likely to disappear. It is, however, exacerbated as the export market becomes increasingly important to the United States.

If only one country were trying to accomplish domestic stability by exporting instability, the international market could serve to cushion internal fluctuations. But almost every country is doing the same thing. It has great similarity to the "beggar-my-neighbor" monetary and trade policies of the 1930s. A world market consisting of uncoordinated, policy-induced residuals is inherently more unstable than a free trade market. It also makes unilateral movements toward freer trade irrational because on the export side this places the freer trade nation in the position of a residual supplier absorbing the brunt of international fluctuations in supply and demand. As long as nations continue to pursue inward-looking domestic agricultural policies that use the international market as a safety valve, this problem will persist. The U.S. position is more complicated because the United States is both an importer and an exporter.

But agricultural policy has a second set of problem interfaces. These are the interrelationships between agricultural and general economic and diplomatic policy. A few examples will demonstrate the issues. While U.S. agricultural imports in constant dollars grew at an annual rate of 3 percent from 1960 to 1979, U.S. agricultural exports grew at an annual rate of 6 percent.¹ In the same period total U.S. agricultural production grew at an annual rate of 1.8 percent. Thus, the net trade balance in agriculture has changed from a deficit in the 1950s to a large surplus in the late 1970s. This growth in the net agricultural trade surplus (about 11 percent per year in constant 1972 dollars) has made an important contribution to the overall U.S. balance of trade, which has steadily worsened as the price of petroleum and other imports have increased. Consequently, agriculture has become an important element of national trade policy. The use of export controls to accomplish domestic and/or diplomatic objectives has significant impacts on other dimensions of agricultural policy. The soybean embargos applied to control domestic inflation in 1973 and 1975 are examples of the former, while the recent USSR grain embargo is an example of the latter.

A third problem is that monetary and exchange rate policies now impact on agriculture through the international interface to a greater extent. Exchange rate fluctuations have differential impacts on commodities; for example, feed grains go mainly to developed countries and wheat goes mainly to less developed countries. Given that many commodities are produced in specific regions, there are regional impacts of trade policies. Also, the increased dependence of U.S. agriculture on purchased inputs, many of which have import components, causes costs to rise as the value of the dollar declines. In general, the increased internationalization of agriculture raises a large number of macro-economic policy issues (Schuh).

Finally, agricultural product demand expansion programs such as food stamps have international counterparts in Public Law 480. But food aid also can be considered as a component of foreign assistance policy. Here the conflict between short-run export expansion programs and longer-term development assistance programs remains. A rational longer-term assistance program would include expanding imports of raw, semi-processed food and agricultural products from less developed countries to allow them to earn foreign exchange with which to buy, for example, grain. But such a policy has severe regional impacts (e.g., Mexican vegetables) from the redistribution of income from import competitive sectors to export sectors and may simultaneously make income maintenance programs

for commodities such as sugar, tobacco, and fruits and vegetables more expensive.

These issues are sufficient to illustrate the increasing complexities of agricultural trade policy in the four interfaces noted, namely: 1) domestic price and income policy, 2) national economic policy, 3) monetary and exchange rate policies, and 4) diplomatic and foreign assistance policy. However, these are all relatively short-run issues.

There are also some crucial longer-term issues that must be addressed. First, is a policy that emphasizes continuous expansion of exports in the long-run best interest of the United States, or is there a point where resource degradation and environmental impacts become so costly as to render the net cost of larger exports greater than the benefits?

Second, what is the long-run comparative advantage of U.S. agriculture? It is curious that a technologically-advanced, capital-intensive agriculture exports land-intensive products (grains and oilseeds) and imports more capital- and input-intensive products (meat and processed products).

Third, what ought to be U.S. policy towards the developing countries? Should the United States, via technical assistance and high international prices, encourage domestic food grain production in less developed countries? This would be contrary to past implicit policy, which appeared to foster import dependence through low prices and concessional sales.

A fourth question is related to international pricing of exports. Should the United States be pursuing a policy of pricing its export products at higher levels to take advantage of the relatively more inelastic foreign demand created by variable levies and similar policy distortions in importing countries?

Fifth, what should be the trade negotiating stance of the United States with respect to agriculture? Should bilateral and limited multilateral agreements be considered along with the cartel notion, since the multilateral trade approach may have gone about as far as it can go?

Finally, should the United States recognize that world markets are "managed" by domestic policy makers in most countries either by direct policy intervention (the variable levy in the European Community) or by state trading organizations (e.g., the Canadian Wheat Board)? The basic policy question is whether the United States by adhering to private marketing channels places U.S. farmers and consumers at a disadvantage relative to other trading nations.

No matter how offensive philosophically some of these longer-run questions may be to some, they need to be raised as trade policy proceeds into the 1980s.

RELEVANT THEORETICAL TRADE MODELS

The dominant theoretical model used in trade analysis has been the Heckscher-Ohlin general equilibrium model. This model, based on notions of comparative advantage and differential factor endowments, can be used to demonstrate the gains from trade and to determine equilibrium conditions (Houck and Pollak; Schmitz). The elegance of this model, which is used to demonstrate the welfare superiority of free trade, depends heavily on assumptions of perfect competition. Variants of this model are used in analyzing agricultural trade, despite the fact that these markets are extensively distorted by: 1) protectionist domestic policies, (e.g., variable levies, quotas, non-tariff restrictions (NTR's) and state trading), 2) private sector concentration (e.g., the grain trade), and 3) various other factors such as trading blocs, exporter associations, and commodity agreements.

Often trade analysts extend the formal free trade model to make prescriptive pronouncements about the goodness of free trade as a policy objective. Yet, as many authors, including Harry Johnson and Richard Caves, point out, the empirical reality of world markets suggest that imperfect competition theory may be more appropriate. Hillman has clearly shown that agricultural trade is greatly influenced by non-tariff barriers. Yet, very few attempts have been made to apply any other than the competitive model. Most of these attempts involved the application of monopoly theory. Virtually no oligopolistic approach yields satisfactory results (McCalla). The basic theoretical difficulty is that of integrating general equilibrium trade theory with partial equilibrium imperfect competition theory. Unfortunately, the competitive model when used in agricultural trade analysis has serious deficiencies.

Introducing distortions such as taxes and subsidies into competitive models moves us closer to reality, but the additions still do not allow us to deal with the discontinuities introduced by quantitative restrictions and government policy. However, the model is useful in conceptually understanding potential impacts. Diagrammatic representations of the gains from trade and the impact of policy distortions are useful but complex.²

RELEVANT EMPIRICAL RESEARCH

Empirical analysis of trade policy issues has historically been much less voluminous than domestic policy analysis and has taken many distinct forms. Only some general examples are reviewed here. The most frequent approach to empirical analysis of the interface between domestic policy and the international market has been to append an international sector to a model of U.S. agriculture. Much recent work involving aggregate programming and simulation models of U.S. agriculture has included parametric estimates of international demand. Often, several levels are investigated to test the sensitivity of domestic prices and production to hypothesized international scenarios. These approaches, while useful in investigating the potential domestic impact of changes in international markets, do not capture the structure and price formation mechanisms in international markets (Reynolds, Heady, and Mitchell).

A second class of analytical approaches involves world trade models of country and/or regional supply and demand relationships. These approaches produce net export supply and net import demand functions that are aggregated to project a market clearing price and net exports and imports of each participant. The USDA-GOL model is an example (Rojko *et al.*). These approaches may be useful for long-run projections of gross trade activity but lack the dynamics to deal with year to year changes as a result of policy or other shocks.

More recent work in direct estimation of net trade functions that include policy variables seems promising conceptually. However, the statistical results have not stood up to rigorous tests of significance (Abbot). Efforts to build dynamic simulation models of world trade are limited. The Michigan State model (Mitchell) is a start, but its regions are so aggregate that it is difficult to look at particular country impacts. This deficiency is not inherent in the conceptual model. Rather it comes about from the massive costs involved in data collection and analysis, as well as from difficulties in dealing with exchange rate changes, inflation, and domestic policy changes.

None of the models reviewed above pretend to deal with the analysis of actual trade flows. They are essentially price formation models. The class of approaches that attempts both includes spatial equilibrium models of world trade, usually using a programming framework. Because of the nature of the models, these attempts usually yield distorted trading patterns while, at times, doing reasonable jobs of projecting prices.

Another class of approaches has focused on attempting to capture the reality of trade flows by introducing constraints to flows in terms of historic connections, preferential agreements, and the like (Grennes, Johnson, and Thursby). However, general models that capture reality in terms of flows seem to do badly in terms of price analysis. The converse is also true, namely, models capable of reasonable price analyses either do not consider trade matrices or yield improbable estimates. This is probably the case because price formation is heavily influenced by a small number of large traders. However, trade flows involve all traders and are influenced by many factors beyond minimum cost transportation considerations. Therefore, it is unlikely that one model will do both well.³

In sum, models of international markets leave much to be desired in terms of capturing actual price and/or flow behavior in markets. Part of the difficulty is due to the empirical models being based on market clearing, competitive price determination models, which assume structure to be constant. Thus, it is extremely difficult to include structural and price distortions introduced by government policies, state trading, and private sector concentration. Yet alternative approaches, using oligopoly theory, which attempt to capture structural reality, in terms of policy interventions and public and private middlemen with market power, are extremely difficult to estimate. Therefore they yield few, if any, insights into price formation (McCalla).

These approaches are further complicated by the fact that empirical estimates of crucial parameters, such as the import elasticity of demand, range from 0 to well over -6.0 for the same country depending on the assumptions and methodology used. Further, these estimates vary from country to country, from commodity to commodity, and from time period to time period. In addition, most are based on data for the 1950s and 1960s when there was much less variation than in recent periods. Thus, in the international sphere there is no convergence on major empirical parameters comparable to domestic aggregate supply and demand elasticities.

Finally, none of the trade models seem able to deal in a dynamic sense with structural changes in terms of trade flows. For example, the international wheat market has shifted from a market previously dominated by developed country importers such as Europe and Japan. It is now a market where less developed countries take 60 percent of the exports, centrally planned (pre-USSR boycott) take 20-25 percent, and the developed countries take less than 20 percent

on a gross trade basis or less than 10 percent on a net trade basis. Similarly, the importance of centrally planned and high-income, less developed countries in the feed grain and oilseeds markets has increased significantly. These trends not only alter the composition and direction of trade flows, but, more importantly, they alter the character of domestic policies that influence the nature of policy induced residuals. For example, state traders are involved on at least one side of virtually all international wheat transactions (McCalla and Schmitz). Thus, what is needed are new conceptual and empirical approaches to trade modeling to allow rational analysis of domestic policy alternatives.

ALTERNATIVE POLICY SCENARIOS

This section explores the consequences of the three common policy scenarios outlined earlier in this publication plus a fourth dealing with managed trade.

Continuation of the 1977 Act

Continuation of the provisions of the 1977 Act would not alter the general "neo-mercantilist" position of the United States of encouraging greater trade in exportables and managing competitive imports to protect domestic producers. The trade implications of such a policy are dependent on two interconnected sets of variables. The first set consists of policies pursued by importing countries and by exporting competitors. For this analysis it is assumed that the less developed countries continue to pursue low consumer price programs, which discourage production. Therefore, imports, particularly of grain, could be expected to rise. The major constraint to import expansion would be foreign exchange earnings, which in turn are influenced by developed country policy towards imports from less developed countries. Similarly, if the centrally planned economies continue to pursue policies of expanded availability of livestock products, demand for grains should remain strong. In this instance the USSR grain embargo becomes critical in the longer run. It is also assumed that major exporters continue to pursue current policies of using U.S. prices as reference prices and behaving as if the United States is the residual supplier.

These policies in conjunction with the CONTINUATION scenario outlined earlier for the United States should result in world prices remaining above loan rates. Trade flows would occur at world prices largely determined in the U.S. market. Export subsidies would be unlikely provided that U.S. policy was successful in setting loan rates at "world prices." Target prices indexed to production costs could cause U.S. production to continue to increase with the United States becoming increasingly dependent on world markets and therefore subject more to global instability created by natural or policy induced shocks. The magnitude of these shocks could be ameliorated by the national grain reserve program.

If world prices fell as a result of favorable weather and world production increases, the existence of a reserve would cushion the impact in the short run. In the long run, set-aside production control provisions could be used. Alternatively, if, as some argue, we have experienced unusually favorable global crop production conditions over the past five years, then a return to more "normal" conditions coupled with the incessant rate of population increase could portend rising world prices. Rising world prices would induce increased pressure on domestic prices, which could in turn lead to pressure for anti-inflationary measures such as embargoes on exports.

In sum, the CONTINUATION alternative should not yield an international posture materially different than implied by the trends of the 1970s. These trends include increased dependence on export markets, potential instability, a set-aside program, and manageable stocks through the farmer-owned reserve system. This analysis presupposes, of course, no major shocks in terms of crop conditions or diplomatic events.

Compensatory Producer Payments

The outcome of the scenario for exported crops would be not unlike the CONTINUATION alternative. Exports would be encouraged by the slightly lower market prices. Furthermore, the discontinuance of the farmer-owned grain reserve would serve to depress prices in the short run, leading to both increased exports and increased Treasury costs in terms of direct payments. To the extent that target prices were below 1977 Act prices, these impacts would be less severe.

This scenario would have much greater impacts on producers of competitive imports. The scenario implies the abolition of interven-

tion both in the domestic market (supply control) and in imports. The implications of this policy for sugar, tobacco, dairy, and meat markets could be substantial. Producer incomes would be protected via the direct compensatory payments, which would lead to an increase in domestic production. This increase coupled with increased imports would substantially depress domestic prices, leading to some increase in domestic consumption and substantial increases in the direct cost of income support to the U.S. Treasury.

The assumption of composite prices similar to the present ones would minimize production readjustment. However, if increases in production were large, which in turn lead to adjustments in relative internal prices, the resulting internal production adjustments would have strong regional implications as, for example, in sugar.

In sum, the scenario involves relatively little change for exported commodities relative to the CONTINUATION alternative, but it entails substantial changes on the side of import competitive producers. The general impact would be to lower world prices, increasing the cost of income maintenance via direct payments.

Effective Production Control and Higher Price Support

The international implications of such a policy are relatively straightforward. In the short run such a high price support policy would necessitate export subsidies on exportables and require increased restrictions on imports either in terms of increased tariffs or more quantitative restrictions on competitive imports. Given the current U.S. trade surplus on the agriculture account, there would be an increase in the Treasury costs of the export subsidies.

In the longer run, if U.S. supply controls were effective and sufficiently severe to reduce supplies available for export substantially, world prices would rise given the dominance of the U.S. in temperate zone commodity markets. However, such a policy of restriction would in essence return the United States to a position of holding a price umbrella over world markets, which would induce competitive exporters to increase production. This set of circumstances would be not unlike the late 1950s and early 1960s when the U.S. market share of the wheat market decreased.

International Management of Trade—An Innovative Alternative

Description and Provisions. From the present situation in domestic-international policy relationships one can move one of two ways: towards unilateral free trade or towards a more managed world agricultural trade regime. The former is essentially the COMPENSATORY option. The latter is focused on international management of agricultural trade. This second scenario would recognize that national governments are going to continue to support farmers' incomes through domestic programs that will require, as a necessary adjunct, the management of trade relations. For example, this management could involve the exporters recognizing the European Community's (EC) variable levy as an instrument of domestic policy rather than a pure trade restrictive device. Given domestic programs, the question is how best to organize the international market to accomplish participant objectives. This approach of negotiated international policy could take two directions. First, exporters and importers could form a common set of agreements. In simplest terms, these could take the form of multilateral commodity agreements or more complex multilateral, multiple commodity conventions. However, international agreements of this sort do not have an extensive history of "successes." Therefore our innovative variant concentrates on trade management initiated by exporters.

The wheat-feed-grains-oilseed trade dominates temperate zone international agricultural markets. Given U.S. dominance in these markets, any exporter arrangement would have to involve the United States. Therefore, two variants are explored. The first would have the United States joining other exporters to form a grain exporter association (called the "cartel" variant) to enhance foreign exchange earnings. Several factors suggest this variant is possible. First, substantial monopoly surpluses exist in importing countries that pursue protective policies that isolate internal farm prices from world prices at high levels (e.g., EC and Japan). Second, the world grain trade is dominated by four exporters, two of which (Canada and Australia) already have in place institutional arrangements usable in a cartel. Third, theoretically consistent market share and retaliation rules exist that can enforce cartel discipline. If, for example, a price discriminating cartel were formed that sold primarily to developed and centrally planned countries at high prices and sold the remainder in a residual market consisting of the domestic market and low

income, less developed countries, there seems to be substantial possibilities for increasing foreign exchange earnings. This approach would mean lower domestic grain and, therefore, livestock prices. Returns from an export levy could be returned to farmers in return for supply management via direct payments.

A second possibility would be for the United States alone to manage export earnings. This could be accomplished by a series of bilateral agreements with major importers (e.g., the U.S.-Soviet grain agreement) and is, therefore, called the "bilateral" variant. In the feed grain and soybean markets U.S. dominance is so large that it could almost perform as a monopolist using the threat of increased prices to encourage major importers to sign long-term bilateral agreements that would assure continuation of U.S. market shares. Bilaterals are often criticized because they create instability in the residual markets not covered by the agreements. However, it is not clear that if the major exporters and importers were covered in bilaterals such instability would necessarily occur.

Consequences. The consequences of such an approach (or approaches) for U.S. agricultural policy are relatively clear cut. If enhanced international prices (either from a cartel or a set bilateral agreement) were passed directly to domestic producers and consumers, substantial increases in domestic farm prices and food costs, as well as increases in domestic production, could be anticipated. This situation would require strong domestic supply control. It also would create difficulties for livestock producers and consumers. However, the price discriminating model alleviates most of these internal problems. Such a policy would, however, be at variance with long standing General Agreement on Tariffs and Trade (GATT) rules, which the United States has, in general, followed.

There also are a set of questions regarding the reactions of: 1) importers and 2) nonmember exporters to increased international prices. In both instances one could anticipate attempts to expand production by assuring higher prices to domestic producers. However, for importers increased self-sufficiency is probably increasingly expensive. Note, for example, continuing European concerns about the costs of the existing Common Agricultural Policy (CAP). On the export side, if most major producers were members of the cartel, the question is not likely critical because potential exporters of grain and soybeans are not numerous.

The United States for many years has either held a price umbrella over world markets or performed as a price-taking residual supplier.

Although this particular innovative alternative approach is not being advocated, a more aggressive policy is suggested to be worthy of careful analysis in the upcoming policy discussion.

NOTES

1. For more detail see the Statistical Appendix, Tables 1, 14, and 15.
2. The reader is referred to the excellent presentation by Jones and Thompson.
3. A recent paper by Thompson contains an excellent review of empirical approaches.

REFERENCES

- Abbott, Philip C. "Modeling International Grain Trade with Government-Controlled Markets." *Amer. J. Agr. Econ.* 61(1979): 22-31.
- Caves, Richard E. "International Cartels and Monopolies in International Trade." in *International Economic Policy: Theory and Evidence*. Rudiger Dornbusch and Jacob A. Frenkel, eds. Baltimore: the Johns Hopkins University Press, 1979.
- Grennes, T., P.R. Johnson, and M. Thursby. *The Economics of World Grain Trade*. New York: Praeger Publishers, 1978.
- Hillman, Jimmie S. *Nontariff Agricultural Trade Barriers*. Lincoln: University of Nebraska Press, 1978.
- Houck, James P. and Peter K. Pollak. "Basic Concepts of Trade." in *Speaking of Trade: Its Effect on Agriculture*. Spec. Rep. 72. Agr. Ext. Ser. University of Minnesota, 1978.
- Johnson, Harry G. "International Trade Theory and Monopolistic Competition Theory." in *Monopolistic Competition Theory: Studies in Impact*. Robert E. Kuenne, ed. New York: John Wiley & Sons, 1967.
- Jones, Bob F. and Robert L. Thompson. "Interrelationships of Domestic Agricultural Policies and Trade Policies." in *Speaking of Trade: Its Effect on Agriculture*. Spec. Rep. 72. Agr. Ext. Ser. University of Minnesota, 1978.
- McCalla, Alex F. "Strategies in International Agricultural Marketing: Public vs. Private Sector." in *International Trade and Agriculture: Theory and Practice*. Jimmie S. Hillman and Andrew Schmitz, ed. Boulder, Colorado. Westview Press, 1979.
- Mitchell, Donald. "The MSU Agricultural Trade Model." Dept. Agr. Econ., Michigan State University, 1979. Processed.
- Reynolds, T.M., E.O. Heady, and D.O. Mitchell. *Alternative Futures for American Agricultural Structure, Policies, Income, Employment, and Exports: A Recursive Simulation*. CARD Rep. 56. Ames: Iowa State University, 1975.

- Rojko, A.D., D. Regier, P. O'Brien, A. Caffing, and L. Bailey. *Alternative Futures for World Food in 1985—Volume 1, World GOL Analytical Report*. For. Agr. Econ. Rep. 145, USDA-ESCS, 1978.
- Schmitz, Andrew. "Research in International Trade: Methods and Techniques with Emphasis on Agricultural Trade." in *International Trade and Agriculture: Theory and Practice*. Jimmye S. Hillman and Andrew Schmitz, ed. Boulder, Colorado: Westview Press, 1979.
- Schuh, G. Edward. "The New Macroeconomics of Agriculture." *Amer. J. Agr. Econ.* 58(1976): 802-11.
- Thompson, Robert L. "Survey of New Developments in Agricultural Trade Analysis and Forecasting." Dept. Agr. Econ., Purdue University. June 1979. Processed.

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5 STRUCTURAL CHANGES IN FARMING

Bruce Gardner

INTRODUCTION TO THE PROBLEM

Several different and sometimes ill-defined issues have been raised by farmers, agricultural economists, or political leaders as "structural" problems. What makes them public policy problems is a perception that they involve trends in the economic organization of agriculture that will, if unchecked, adversely affect the interests of farmers, consumers, or the general public. While a wide range of public policies could be used to influence the structure of agriculture, this analysis concentrates on the connections between structure and farm commodity policy as encompassed in the Food and Agriculture Act of 1977.

Policies concerning credit, research and extension, taxation, or the regulation of agriculture, which are probably more important than commodity programs in determining structure, are only briefly discussed. Realistically, any policies directed at structural change in the 1981 agricultural and food legislation will probably be couched in terms of special provisions in the commodity programs rather than changes in tax laws, credit programs, or the direction of research.

THEORETICAL AND FACTUAL BACKGROUND

Two related but distinct areas of structural change in farming have caused concern. The first pertains to the marketing of farm products, the second to the economic organization of agricultural production.

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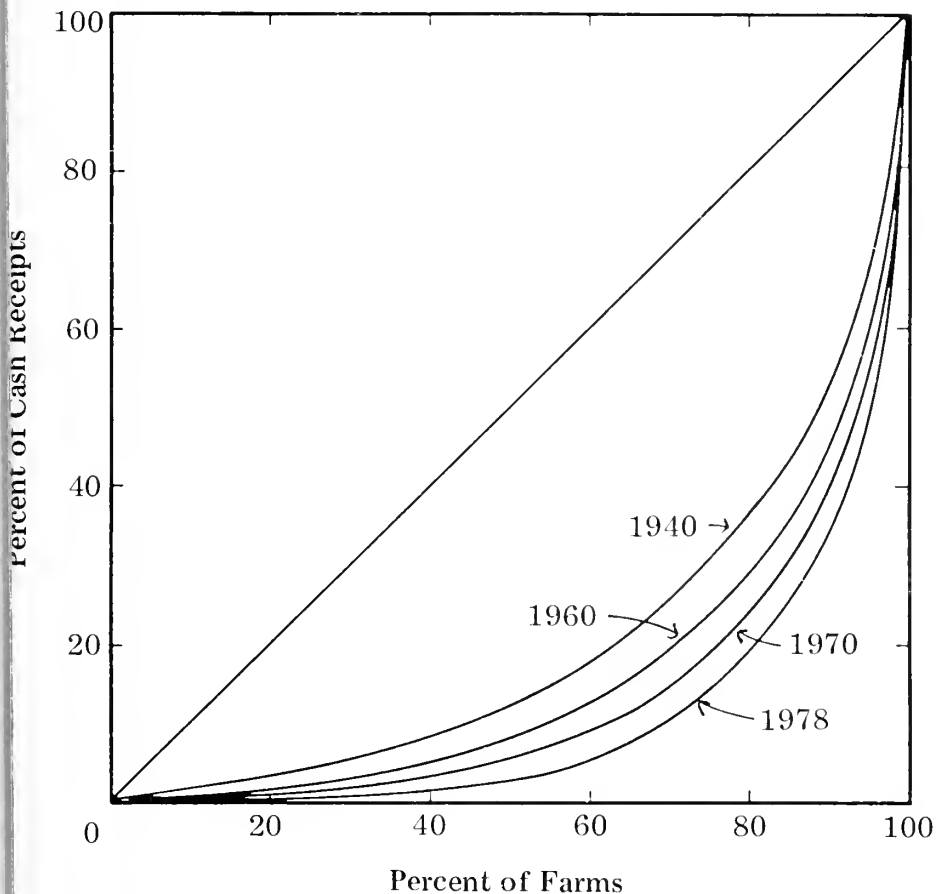
The structure of the marketing industries has long been seen as an economic threat to both consumers and farmers because of the market power of middlemen as compared to farmers. The newer marketing concerns result from the linkages between farms and the imperfectly competitive marketing sector. One issue here is a trend toward replacement of auction markets by forward contracting, formula pricing, or other devices that reduce the role of publicly quoted bids and offers in establishing market price. Another issue is collective action by farmers, often by means of marketing cooperatives, to increase their market power. While these issues have been discussed by agricultural economists, there is no consensus about the quantitative, and in some cases even the qualitative, effects of these marketing trends on the economic welfare of consumers, farmers, and middlemen. However, these marketing issues are not central to the prospective 1981 food and agricultural legislation.

The issues about the structure of farm production units stressed by Secretary Bergland and others constitute the second major area of concern. The most commonly cited potential problem related to structural change is the concentration of agricultural production. The best relevant data are the estimates of number of farms by value-of-sales classes published annually in USDA's *Farm Income Statistics*. Unfortunately, the declining value of the dollar coupled with fixed nominal sales-class boundaries makes it difficult to determine trends from these data.

A meaningful way to use these data is with a Lorenz curve, plotting cumulative percentages of farm numbers starting from the smallest. In Figure 3 the curve for 1978 shows that the smallest 40 percent of U.S. farms accounted for a little less than 2 percent of sales, which implies that the largest 60 percent of farms accounted for 98 percent of sales. These curves for four years reveal a substantial trend toward increasing concentration since 1940. In that year, the smallest 40 percent of farms was roughly four times as important as they are today in relative terms, accounting for 8 percent of sales. Similarly, the largest 20 percent of farms has increased in relative importance from about 64 percent of sales in 1940 to 80 percent in 1978. Other contrasts of this type can be read from the Lorenz curves shown. If these data included farm products used on the home farm as well as sales, the trend in concentration would be still more dramatic. This is because home-used commodities are less concentrated on larger farms and have become a smaller share of farm output over time.

Increasing concentration, as represented by more curvature in the Lorenz curve, is a phenomenon quite distinct from simply de-

increasing numbers and increasing average size of farms. The reduction by half since 1950 in the number of farmers in the United States and the more than doubling of their average size does not imply increasing concentration. Indeed, if the farms that cease to be come predominantly from the smaller sales classes and are absorbed into other small farms, then a declining number of farmers would tend to reduce concentration. Similarly, if all remaining farms were increasing in size and at the same rate, then their relative shares of



Sources: USDA-ESCS. *Farm Income Statistics*. Stat. Bull. 627, Oct. 1979, and U.S. Department of Commerce. *Census of Agriculture*. 1940.

Figure 3. Concentration of Cash Receipts.

output would be constant and their Lorenz curve would remain unchanged.

It is clear, then, that the increasing concentration of agricultural production is not simply the result of declining farm numbers and increasing average farm size. What is the explanation for this trend? There have been many contributing factors. The nature of technical change in farm production, and its interaction with risk and the managerial skills of farmers, is probably important. Changes in the product and input markets, such as reductions in the relative prices of inputs more intensively used in large-scale production, likely played a role. Developments in the farm real estate markets, especially with general inflation and a tax code favoring capital gains, seems to have encouraged farmland investment by nonfarm people. This real estate trend made it more difficult for the moderate-sized, fully owned family farms to compete. There is no definitive research that isolates the relative importance of various exogenous influences on the economic organization of agriculture.

WHY IS THERE A STRUCTURAL PROBLEM?

Concentration in and of itself is a structural problem that merits public attention when it leads to suboptimal industry performance. Thus, concentration leads to legitimate anti-trust concerns in many industries. But in agriculture, apart from a few minor commodities, there are still thousands of producers, not an oligopoly. While some have raised the spectre of price-gouging corporations in control of the nation's food supply, this does not seem to be likely in the foreseeable future. The issue of competitiveness in marketing seems more pertinent. Under marketing orders, it is conceivable that thousands of producers could attain quasi-cartel status. However, this is not a likely area of imminent policy development.

The broader concern about structural change seems to stem not from increased concentration *per se*, but from the institutional forms it takes. Fewer and larger farms are less likely to be family farms in the traditional sense. That is, less of the labor will be supplied by the farm operator and family, more of the land will be owned by nonfarm residents, less of the capital for investment will come from internally generated farm funds, and the operator's managerial role may be diluted or even usurped. In certain segments of animal agriculture these trends have already caused dramatic change. While these trends are disturbing to many people, this does

not imply that policy steps to prevent them would be best for the country. At the same time, it seems likely that some past policies have influenced these trends, and that future policy alternatives have structural implications that should be assessed and discussed.

RELEVANT EMPIRICAL KNOWLEDGE

On the broad issues of the causes of structural change in both U.S. agricultural marketing and production, and on the narrower questions of the effects of particular policies, the existing evidence is weak. The best available surveys of the state of our knowledge about structure include Schertz et al., USDA 1979a Congressional Budget Office, North Central Policy Education Committee, and Western Regional Research Committee W-104. The results and conjectures in these surveys rest on a very thin empirical and analytical base. Virtually the only relevant primary research has been aimed at investigating economies of scale or size in farming (Carter and Dean; Madden and Partenheimer; Quance and Tweeten; Hall and LeVeen; Miller). Work on net returns by sales class, such as by Hottel and Reinsel, suggests that larger farm operations have greater advantages in returns to equity than declining average cost curves can account for. These studies, as a group, suggest that some but by no means all of the growth in farm size is a consequence of increasing returns to scale in production processes.

Research stemming from the work of Schuh on the farm labor market, from Sjaastad on off-farm migration, and recent research on schooling, productivity, and off-farm work (e.g., Huffman; Welch; Wallace and Hoover) has contributed to the beginnings of an understanding of structural change resulting from investment in human capital and adjustment in labor markets. But these studies, together with the research on economies of size, have not yet generated adequate explanations of observed changes in sales-class or land-ownership concentration, or other aspects of observed change in the economic organization of agriculture.

The research problems in assessing the structural effects of particular government policies and programs are more straightforward. The tax code, for example, spells out a set of tax rates, exemptions, and other rules whose structural consequences are in some cases apparent. Nonetheless, severe difficulties arise in trying to assess the overall effect of the tax system (Sisson, USDA 1979b). Some agricultural credit programs have explicit provisions for eligibility that

are related to size, but again the net effects on the economic organization of the farm sector are not readily inferable.

In all attempts to estimate the consequences of policy intervention, two very difficult but crucial problems arise. First, it must be specified to which situation the policy in question is being compared. The effects of the current income and inheritance tax laws have been said to increase concentration. Compared to what alternative? A steeply progressive tax system? A proportional tax? No tax? Second, after deciding on the alternative with which to compare current policies, how can the alternative effects on the structure of agriculture be judged?

Despite these difficulties, there have been many attempts by researchers to assess the structural effects of commodity price-support programs. The literature that contains the most detailed empirical work pertains to the income distributional consequences (Robinson; Bonnen; Schultze; Lidman; Gardner and Hoover; USDA-ESCS 1979c). The general finding is that the programs have increased the inequality of the distribution of income in agriculture. However, it requires further analysis and empirical work to assess whether changes in the economic organization of the farm sector have resulted from this redistribution.

It has been argued, for example, by Quance and Tweeten and by Penn and Boehm, that price support programs can be expected to increase the average size and concentration of farm production units. One reason advanced is that high price supports generate windfall gains for large producers relative to smaller, higher-cost producers. These gains are claimed to allow larger producers to outbid smaller producers for land, presumably because high product prices increase the rental value of land more in large production units than in small production units. However, in most standard analytical models, optimal size of a competitive firm (minimum of average-cost function) is independent of product prices. Moreover, it leaves unanswered how the small, high-cost producers could continue in operation without high price supports.

A second argument traces structural effects of farm programs through the reduction of price risk. Pope and Gardner discuss three ways in which policies that reduce risk can increase farm size: 1) increased output by risk-averse producers with given factor and product prices, 2) increased input supply by factor owners, and 3) encouragement of adoption of decreasing-cost technologies. In addition, risk reduction under a given technology has been hypothesized to induce increased specialization. This hypothesis includes

specialization in farm enterprises as well as specialization in commercial agriculture as opposed to a mix of on- and off-farm work by the operator. That the ratio of net family income to gross receipts becomes smaller with larger-scale operations means that risk increases with size, *ceteris paribus*. Price stabilization by means of commodity programs reduces the risk in moving to a larger-scale, specialized operation and might therefore encourage such shifts.

Nelson and Cochrane estimated that the average farm size increased between 1953 and 1972 because of the farm commodity programs. However, it is not clear that structural effects of farm programs can be isolated statistically in their model. Thus, it must be concluded that empirical research has not yet established definitively any relationship between commodity programs and changes in the structure of U.S. agricultural production. There seems to be more disagreement among researchers on the status of this relationship than on any other issue in structural change. Some believe that commodity programs are among the most potent sources of past and current structural change in agriculture, while others emphatically maintain that this hypothesized relationship has not been substantiated. It seems likely that past programs have had some effect on structure, even though the magnitudes cannot be precisely estimated. Further, it seems clear that any policy will have some structural consequences, and that the pending 1981 legislation could be designed to have substantial planned structural effects.

POLICY ALTERNATIVES

Continuation of the 1977 Act

The 1977 Act continued payment limitations at about the same minimal level of effectiveness as the 1973 Act. This is virtually the only structurally directed feature of current commodity programs. It has been estimated that of 750,000 participants in 1978 commodity programs, 1,184 producers (0.2 percent) were affected by the limit of \$40,000 for wheat, feed grains, and cotton combined payments, and the limit of \$52,250 for rice. Payments foregone because of the limitations were estimated at \$25 million (1.4 percent of total payments under the programs), or about \$20,000 for each affected producer (USDA-ESCS, 1979c, p. 37).

Continuation of the same general approach in future policy would continue to place a penalty on the very largest operations. But overall it would not have an important impact on structural change. However, the effect would be increased if support prices were set substantially higher relative to market prices than they have been under the 1977 Act. For commodities other than the grains and cotton, there would continue to be no explicit structural provision in the commodity policy.

The effects of the continued level of payment limitations on consumers, taxpayers, and producers, other than those few directly limited in payments received, would be negligible.

Compensatory Payments

With a payment limitation, this approach would have essentially the same structural impact as the CONTINUATION alternative. With no payment limitations, this approach would provide incentives for large operators to expand and to specialize in response to the guaranteed producer price level. However, the guarantee would also enable small-scale and part-time operations to stay in business if they desired. It would operate analogously to the protection that import tariffs provide for high-cost domestic producers or to the effects on structure of higher prices from rising export demand. The net effects on the structure of agriculture are not predictable.

It is possible that guaranteed returns above normal market-clearing levels would promote the growth of both very large, specialized farm operations and exceptionally small, high-cost farming. The farms at each end of the size distribution would gain relative to medium-sized farms, whose advantage from achieving moderate scale economies coupled with minimal risks of specialization and leverage are made less valuable by the program.

Effective Production Control and Higher Price Support

This policy approach could be administered so as to have substantial structural consequences. The prototype of such a policy could be the tobacco program, which has contributed more to the perpetuation of smaller-scale operations than for any other important farm commodity. This was accomplished by tying rights to produce and market tobacco historically to small plots. Some consolidation

and growth of tobacco operations has been permitted by limited (within county) lease and transfer provisions. Under a similar approach for other commodities, rights to produce could be administered to achieve almost any desired structural effects.

The consequences for producers and consumers of imposing structural change by means of allocating rights to produce would depend on the particular approach taken. Limiting allotments to small farms would reduce the size of farm operations. But with diseconomies of size and regional inflexibility such an approach would increase production costs and could easily have substantial adverse effects on consumers through higher food prices. Making production rights negotiable or fully transferable would reduce such adverse consumer costs. While both approaches would influence structure, the income distribution impacts would differ.

Price Supports Designed to Alter Structure—An Innovative Alternative

The most practical means to tailor commodity programs to structural goals is to establish differential graduated support prices or payments levels based on size of the farm operation. For example, each producer might receive a 25 percent bonus payment on the first \$5,000 of deficiency payments for the sum of all crops grown (an individual crop-by-crop approach would encourage wasteful diversification among crop enterprises). This initial payment might be coupled with a 10 percent bonus on the next \$5,000, followed by no bonus and an upper total payment limit, e.g., \$25,000. Such an approach would provide an implicit subsidy to smaller-scale relative to larger-scale farming. The degree of the differential could be adjusted to achieve whatever penalty to large-scale production was desired.

The wisdom of aiming commodity programs at structural goals depends on the tradeoffs between efficiency in producing and marketing the nation's food and fiber and the social goals that are believed to be furthered by smaller-scale farming. Moreover, if smaller-scale farming is to be promoted, it may be more efficient to do so through other policies, e.g., tax policy, than by means of commodity programs. Also, noncommodity farm policy, such as the recently discussed limitation of 160 acres to be eligible for federally subsidized irrigation water, could also be considered.

The commodity program approach to the structural problem can affect only the producers of products for which the programs are an

important determinant of the producer's economic success, and this may apply to only a minority of farm production under future farm programs. Generally, the scientific basis for social engineering of farm structure is too unreliable to support optimism about successful achievement of such legislative goals.

REFERENCES

- Bonnen, J.T. "The Distribution of Benefits from Selected U.S. Farm Programs." *Rural Poverty in the United States*. Washington, D.C.: National Advisory Committee on Rural Poverty, 1968.
- Carter, H.O. and G.W. Dean. *Cost-Size Relationships for Cash Crop Farms in Imperial Valley, California*. University of California Giannini Foundation Res. Rep. 253, 1962.
- Gardner, B.L. and D.M. Hoover. *U.S. Farm Commodity Programs and the Inequality of Farm Household Income: 1969*. North Carolina State University, Econ. Res. Rep. 35, September 1975.
- Hall, B.F. and E.P. LeVeen. "Farm Size and Economic Efficiency." *Amer. J. Agr. Econ.* 60(1978): 589-600.
- Hottel, J.B. and R.D. Reinsel. *Returns to Equity Capital by Economic Class of Farm*. USDA-ERS. Agr. Econ. Rep. 347, August 1976.
- Huffman, Wallace. "Allocative Ability: The Role of Human Capital." *Quart. J. Econ.* 91(1977): 35-39.
- Lidman, R. "The Distributional Implications of Agricultural Commodity Programs." *The Economics of Federal Subsidy Programs*. Washington, D.C.: U.S. G.P.O., 1973.
- Madden, J. and E.J. Partenheimer. "Evidence of Economies and Diseconomies of Farm Size." in *Size, Structure, and Future of Farms*. G. Ball and E.O. Heady, eds. Ames: Iowa State University Press, 1972.
- Miller, T.M. "Economies of Size and Other Growth Incentives." *Structure Issues of American Agriculture*. USDA-ESCS. Agr. Econ. Rep. 438, 1979, pp. 108-115.
- Nelson, F.J. and W.W. Cochrane. "Economic Consequences of Federal Farm Commodity Programs, 1953-1972." *Agr. Econ. Res.* 28(1976): 52-63.
- North Central Public Policy Education Committee. *Who Will Control U.S. Agriculture?: A Series of Six Leaflets*. North Cent. Reg. Extens. Publs. 32-1 through 32-6, University of Illinois, 1972.
- Penn, J.B. and W.T. Boehm. "Research Issues Reemphasized by the 1977 Food Policy Legislation." *Agr. Econ. Res.* 30(1978): 1-14.
- Pope, R.D. and B.D. Gardner. "The Structure of Agriculture and Risk." *Market Risks in Agriculture: Concepts, Methods, and Policy Issues*. P. Barry, ed. Texas Agr. Exp. Sta. DTR 78-1, July 1978.

- Quance, L. and L.G. Tweeten. "Policies, 1930-1970." in *Size, Structure, and Future of Farms*. G. Ball and E.O. Heady, eds. Ames: Iowa State University Press, 1972.
- Robinson, K.L. "The Impact of Government Price and Income Programs on Income Distribution in Agriculture." *J. Farm. Econ.* 47(1965): 1225-1234.
- Schertz, L.P. et al. *Another Revolution in U.S. Farming*. Washington, D.C.: USDA, 1979.
- Schuh, G.E. "An Econometric Investigation of the Market for Hired Labor in Agriculture." *J. Farm Econ.* 44(1962): 307-321.
- Schultze, C.L. *The Distribution of Farm Subsidies*. Washington, D.C.: Brookings Institution Staff Paper, 1971.
- Sisson, C.A. "An Intersectoral Examination of Tax Equity: Farm and Nonfarm Burdens." *Public Fin. Quart.* 7(1979): 455-478.
- Sjaastad, L.A. "The Costs and Returns of Human Migration." *J. Polit. Econ.* 70(1962): Supplement.
- U.S. Congressional Budget Office. *Public Policy and the Changing Structure of American Agriculture*. U.S. G.P.O., Sept. 1978.
- USDA-ESCS. *Structure Issues of American Agriculture*. Agr. Econ. Rep. 438, 1979a.
- _____. *Proceedings of Symposium on Farm Estate Issues Raised by the Tax Reform Act of 1976*. ESCS 73, 1979b.
- _____. *Status of the Family Farm: Second Annual Report to the Congress*. Agr. Econ. Rep. 434, 1979c.
- Wallace, T.D. and D.M. Hoover. "Income Effects of Innovation: The Case of Labor in Agriculture." *J. Farm Econ.* 48(1966): 325-336.
- Welch, Finis. "Education in Production." *J. Polit. Econ.* 78(1970): 35-39.
- Western Regional Research Committee. *Economic Growth of the Agricultural Firm*. Washington State University W-104, Tech. Bull. 86, 1977.

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6 GRAIN RESERVE POLICIES IN AN UNCERTAIN WORLD

Willard W. Cochrane, Marshall A. Martin, and R.G.F. Spitze
POLICY PROBLEM

Do the citizens of the United States want a publicly-operated grain reserve program with the capacity to even out grain supplies and stabilize grain prices over time? The answer to that question is by no means clear as of mid-1980. The majority of grain farmers want a price floor under their products but no form of a price ceiling over their products. Grain traders and processors have expressed a wide range of views regarding the desirability of attempting to stabilize grain prices, but most have voiced opposition to the establishment of a major governmental program—a reserve stock policy—designed to stabilize grain prices in the marketplace. Livestock producers generally favor stable grain prices, but they are less sure of the desirability of overt governmental actions via a grain reserve program to stabilize those prices. Consumers are always opposed to increases in the price of food, but they often fail to see the relationship between the operation of a grain reserve program and food price stability. Support for a grain reserve program among consumer groups ranges from strong to weak. Thus, there are currently varying forms of, and degrees of, interest in a governmentally-operated grain reserve program, but no clear public consensus either for or against such a program.

Administration leaders and congressional leaders who share a responsibility for stabilizing farm and food prices to both consumers

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and producers have shown considerable interest in a grain reserve program. This interest is evidenced by the establishment of the limited farmer-owned grain reserve program under the Food and Agricultural Act of 1977. This particular program is not a complete stabilization program nor is it a commitment to stabilize grain prices within any defined range. The program is viewed by administration leaders as a means of contributing to increased price stabilization but in no sense guaranteeing it.

If the sole objective of the public policy were to stabilize domestic grain prices within some defined range, this could be easily achieved by regulating exports, and there would be no need for a grain reserve program. No grain reserve would be needed because this nation exports a large share of its grain production. However, the United States does have other economic objectives. First, it is highly desirous of being recognized as a dependable supplier of grain to its regular customers. Second, it is desirous of maintaining an international system of trade that is as free as possible. Third, it is desirous of contributing to the stabilization of international grain markets; certainly it does not want to contribute to their destabilization. Fourth, it is committed to helping the very poor nations of the world meet their basic food needs.

Considering those objectives, the United States must think in terms of a grain reserve program, or some set of institutional arrangements, that has the capacity to even out supplies through time and thereby stabilize world grain prices. This goal could be achieved by the United States operating unilaterally a grain reserve program that has the capacity to stabilize world prices, by supporting a centralized international grain reserve program managed by some international agency, or by participating in an international network of coordinated national grain reserve programs. And some combination of the above approaches to world grain price stabilization might be given a trial, as will be suggested in the final section of this chapter. But given the varied economic objectives of the United States, as outlined above, it appears to be inappropriate, even unproductive, to consider the establishment of a national grain reserve that has the goal of stabilizing domestic grain prices alone.

THEORETICAL BACKGROUND

As Houck and Ryan state in their survey of grain reserve studies, the theoretical literature dealing with commodity price stabilization

is wide, deep, and growing. This theoretical work has been surveyed recently by Burnstein and in chapters in the same book by Turnovsky, Sarris and Taylor, and Smith. Burmeister provides useful overviews and summaries of this literature. But, based on the theoretical literature, no clear, unambiguous understanding exists about the cases to be made either for or against deliberate efforts on the part of some public agency to stabilize the prices of a product. Waugh (1944), employing the concept of consumers' surplus, demonstrated that consumer welfare increases when the price of a single commodity fluctuates as compared with what happens when the price of the commodity is stabilized at its arithmetic mean. Oi, using the concept of producers' surplus, later demonstrated that producers too would experience economic gains from price instability. Massel integrated the Waugh and Oi results in a model containing both consumers and producers and reached the conclusion that a society would reap positive welfare gains from the stabilization of the price of a single product if compensation between consumers and producers is feasible and does occur. Samuelson (1972) is critical of almost every aspect of the Waugh and Oi approaches.

Turnovsky, Shalit, and Schmitz move away from a strict consumers' surplus approach and toward a more general utility approach. Their approach maintains that the more price inelastic the product demand, the more of the consumer's budget spent on the product, and the greater the consumer risk aversion for the product, then the greater will be the welfare gains to consumers from product price stabilization, and vice versa. Hence, when these conditions are met, it may be deduced that consumers generally would gain from the stabilization of food prices. Thus, a theoretical underpinning is, at long last, being constructed which contributes to an understanding of general price stabilization for the food sector.

In summary, numerous perceptive questions have been raised with regard to the applicability of this theoretical literature to the resolution of urgent policy problems. The welfare analyses cited (with the possible exception of Turnovsky, Shalit, and Schmitz) are of limited use in solving policy problems. This is because they employ partial equilibrium analysis, which assumes perfectly competitive markets, perfect information (i.e., there is no uncertainty), and a constant marginal utility of money. Finally, and most important for policy decision making, the whole welfare literature on price stability assumes costless stabilization. Therefore, the relevance of this literature to the policy question of grain reserves is open to serious questions because the holding of reserves is not costless.

QUANTITATIVE PICTURE

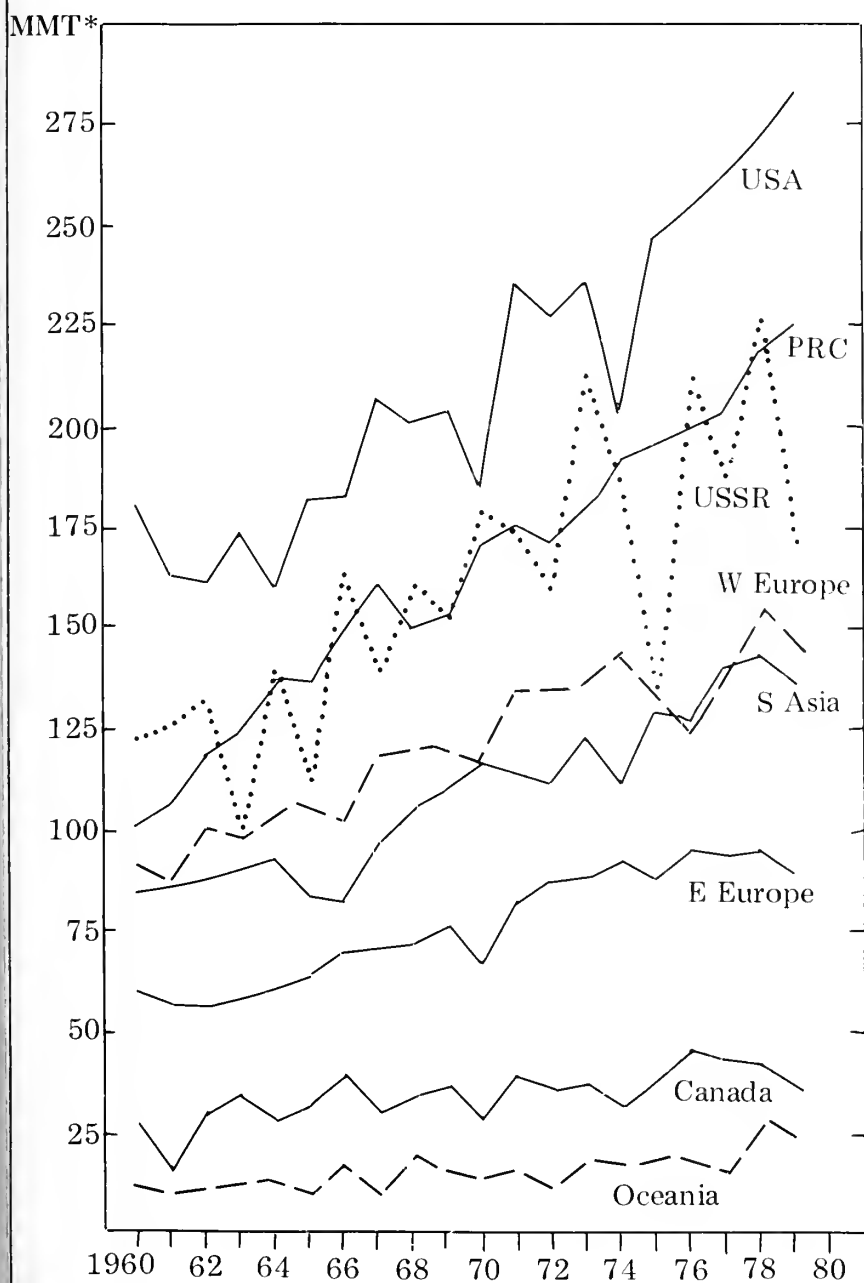
As may be seen in Figure 4, total grain production has fluctuated widely from year to year in the United States and the Soviet Union. Further, and most importantly, these fluctuations do not fall into a regular pattern; i.e., they are unpredictable. We observe also some significant variations in total grain production in Western Europe, South Asia, and Canada. When several regions experience a poor crop in the same year, as occurred in 1972-1973, following some extremely poor crops in several regions in 1970-1971, the limited stocks of grain melt away, and the interlinked world market experiences a grain shortage. Given the extreme inelasticity of world demand for the grains, such a shortage causes grain prices to shoot skyward. Grain crops around the world were very good in 1973-1974 (see Figure 4). But several regions of the world again experienced poor crops in 1974-1975, and the grain crisis of 1972-1973 began to return with rising grain prices.

The total world grain balance is summarized in Figure 4 and Statistical Appendix Tables 21-24. Total world grain production fell below trend in 1972-1973, 1974-1975, and 1975-1976 and again in 1979-1980. World stocks of grain fell to pipeline levels in 1972-1973 and remained at that precarious level through 1975-1976. World stocks of grain were built up during the period 1976-1977 through 1978-1979. But in 1979-1980 world stocks of grain took another tumble. Further, total stocks of wheat and coarse grains as a percent of world utilization declined in the 1970s from what they were in the 1960s.¹

World utilization of grain is increasing at just about the 1960-1971 production trend line (Figure 5). Thus, the fluctuations in production around the trend line result in an accumulation or deaccumulation of stocks with a consequent fluctuation in world grain prices. But whenever grain stock levels are reduced to pipeline levels, physical grain shortages begin to appear in grain-deficit countries around the world, and grain prices increased sharply. And this world grain price instability will very likely be intensified in the future as grain production is pushed onto marginal lands where yields are highly variable.

SUMMARY OF THE EMPIRICAL RESEARCH²

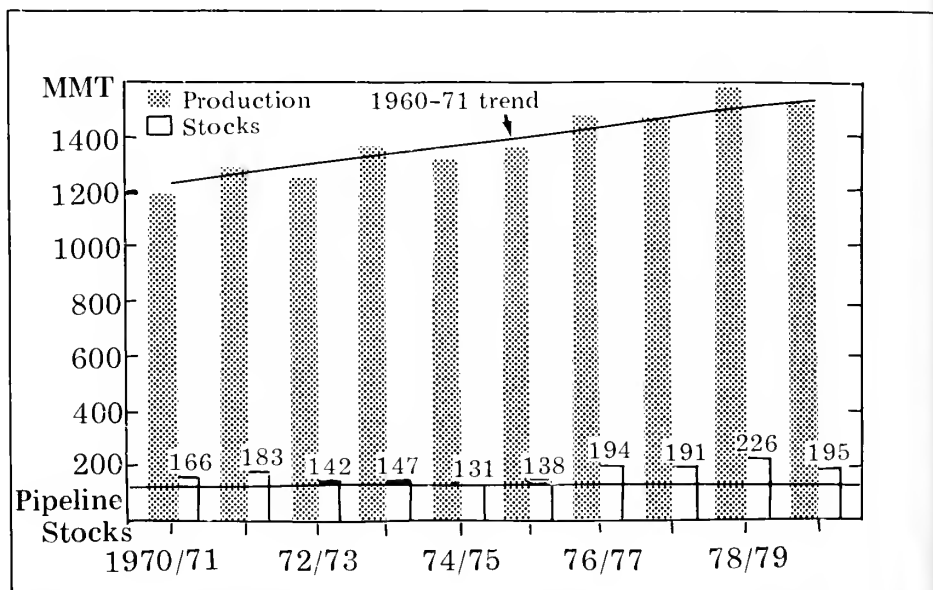
Empirical research on grain reserves and grain storage has a reasonably long history. Gustafson, in 1958, showed that under perfect



*Million Metric Tons.

Source: USDA-ESCS.

Figure 4. Total Wheat, Coarse Grain, and Milled Rice Production by Countries and Regions, 1960-1979.



Source: Schnittker Associates, Washington, D.C., February 1980.

Figure 5. World Grain Production and Stocks, 1970-1971 to 1979-1980.

competition private grain holders would store and release grain optimally so that expected marginal returns from storage would equal marginal costs. Waugh, in a pioneering study in 1967, provided some empirical estimates of needed reserve stock levels for the United States for the several grains.

But an avalanche of empirical studies dealing with grain reserves occurred in the 1970s, particularly since the great price upheaval in 1972-1973. This research has dealt with two interrelated policy goals: grain price stability and food security. Both goals are sought to mitigate the adverse consequences of fluctuations in grain production, caused mainly by weather fluctuations and magnified by barriers to trade. But this research has typically moved in different directions. Studies that focus on market price stabilization often do not address the impacts of instability on the poor and vulnerable groups in the world populations, although some argue that eliminating the peaks and troughs of price fluctuations contributes indirectly to food security. On the other hand, studies of the means to prevent critical food shortages tend to stress only grain supply availability for poor nations and for poor people in those nations. The impact

of storage or reserve stocks on prices is often ignored in such studies. Further, food aid policy often becomes related in some way to food security studies.

In general, research sponsored by international organizations (e.g., World Bank, FAO) tends to focus on grain reserves as a means of providing food security, while studies undertaken by economists in universities and research foundations tend to emphasize national or international price stabilization. This dichotomy with regard to grain reserve goals acts to confound and confuse the debate about grain reserve policies. Researchers concerned with food security may not pursue the implications of their proposals on grain markets. Conversely, researchers who emphasize the price stabilization of grain reserves may fail to examine the food security implications of their proposals.

Much of the debate about grain reserves has centered on the size of the reserve stock and rules governing its operation. Empirical studies concerned with stock size have either estimated or assumed the appropriate demand, supply, and trade relations for the grains. The nature of these relations is, however, critical to the conclusions.

Since all grain reserve programs seek to smooth out variations in supplies over time, the amount that the supply curve shifts from one year to the next is fundamental. The more variation there is in production, the larger the reserve stock must be to effectively smooth out supplies over time.

In the absence of free trade, national production variations become increasingly relevant. Moving from the global level to the national level has important implications for reserve stock requirements. If, for example, nations adopt policies to balance inter-year supplies from internal stocks, with little or no adjustments in foreign trade, total world stock requirements must increase. And, if trading nations seal off their domestic markets from international supply-price fluctuations, they force the full impact of such fluctuations and adjustments onto those nations maintaining an open link to the world market.

The price elasticities of supply and demand used in the calculation of stock size also have an important effect on the conclusions reached. Although it is generally agreed that demand and supply for grains are price inelastic, there is no general agreement on the exact elasticity values. Yet, a modest change in the price elasticity of demand from -1 to -2 can result in a substantial difference in the conclusion with regard to the required stock size to achieve some desired level of stability. As the price elasticity of demand increases, the stock requirement to stabilize markets decreases.

Despite these difficulties, some firm conclusions can be drawn from the many and diverse empirical studies of grain reserve proposals over the past decade. First, food grain security against most disasters and emergencies that occur around the world could be met by a clearly identified emergency grain reserve of between 10 and 15 million metric tons of wheat and rice above working, or pipeline, stocks. Second, in all but the most extreme cases, world grain price variations could be held within a price band of plus or minus 30 percent of an agreed-upon price level with the deployment of a reserve stock of wheat and coarse grains of some 15 million metric tons. Moving to a price stabilization goal wherein world grain price variations were held within a price band of plus or minus 10 percent of an agreed-upon price level would require the deployment of a reserve stock of perhaps 80 million tons. These are the outside inventory limits of a world grain reserve program. The exact inventory requirements of such a range of price stabilization bands would depend upon: 1) the width of the price band, 2) the accepted risk of being unable to operate because of inadequate stocks, 3) the price responsiveness of demand and supply, and 4) the extent and level of trade barriers. While the empirical results are incomplete, we do know something about the magnitudes of grain reserves necessary to achieve the stated policy objectives.

There is considerably less agreement with regard to the benefits, or costs, of storage or reserve stock programs for producers, consumers, individual country economies, and the world economy. Welfare analyses indicate that world consumers would gain by food grain price stabilization and producers would lose. Similarly, importing countries would gain and exporting countries would lose. But because of the sensitivity of the welfare calculations and the dubious assumptions of these studies, the above conclusions cannot be considered firm conclusions. Moreover, most welfare analyses of a grain reserve program seek to measure the effects of such a program in isolation from other policies and programs rather than in interaction with other policies and programs.

Finally, the impact of storage programs of the export grain economies of the United States and Canada has been the subject of numerous studies (Houck and Ryan, pp. 13-16). Not surprisingly, export variability was found to be a major cause of grain price instability in the United States. Hence, this research indicates that reduced variation in grain exports would reduce price instability in U.S. grain markets as effectively as the operation of an adequately-sized grain reserve program. Further, because large grain exports and high

grain prices tend to go hand in hand, programs designed to stabilize prices tend to reduce producer earnings in the exporting nations in the short run. This conclusion does not, however, take into account the longer-run effects of market stability and assured supplies on export earnings. It may be that importing nations would be more willing to rely on foreign trade for their grain supplies, rather than on domestic production, if they were assured of those supplies.

In sum, the empirical studies are rich in ideas, approaches, and estimates in the broad areas of food security and market stabilization. But the results of those studies still leave much room for debate and controversy with respect to the magnitudes of grain reserve programs, their efficacy, and their desirability.

ANALYSIS OF GRAIN RESERVE ALTERNATIVES

The United States and the world have and will likely continue to experience, wide, sharp, and unpredictable fluctuations in food prices as well as in farm product prices. However, it does not follow that food price stabilization should be achieved through the operation of a reserve stock program for a major food component (i.e., the grains). There are some (e.g., leaders of the American Agricultural Movement) who argue that price stabilization can be achieved through government fiat. And there are others who assert that if all market rigidities and interferences were eliminated, market price fluctuations would be greatly moderated. Consumption adjustments and production adjustments along benign relationships would then produce a desired level of price stability.

Except in certain short-run situations, product price stabilization by command or through exhortation in atomistic markets is unlikely to be productive and hence is not discussed here further. But the elimination of market imperfections and restrictions could, where the relevant relationships are benign, result in increased market price stability. The consumer demand for food is, however, not benign; it is severely price inelastic. Further, runs of good weather or bad weather can lead to large market surpluses or market deficits, respectively. Given the price inelasticity of demand, unless that uneven flow of production is smoothed out over time, farm product prices, hence food prices, must fluctuate in the extreme. Private firms cannot effectuate this smoothing out of food supplies over time because the risks are too high and the costs too great. Thus,

government is invariably called upon to intervene to redistribute those lumpy supplies in a more even fashion over time.

In sum, the logic of an inelastic consumer demand for food and the experience with crop surpluses and deficits both tell us that every country whose food supply is dependent upon uncertain, unpredictable weather should consider a reserve stock program of some kind, somewhere, to even out the flow of staple products (e.g., the grains) over time. And only a strong national government with adequate resources, or a strong international agency with adequate resources, can finance the operation of such a reserve stock program. If the people of a national society, or an international society, wish to achieve a reasonable degree of food price stability, they must be prepared to accept the operation of, and to support financially, a governmentally managed reserve stock program in the staple commodities such as the grains.

In the discussion that follows, three alternative grain reserve program proposals are examined.

Existing Farmer-Owned Grain Reserve

Grain prices were declining in the United States and around the world in 1977 as the result of two bumper crops in a row. In response to these falling grain prices the Carter Administration announced in August 1977 the establishment of a farmer-owned grain reserve program for wheat and feed grains during 1978-1981. The passage of the Food and Agriculture Act of 1977 by the Congress formally authorized the grain reserve program. This program offered farmers a long-term loan on their grains plus payments for storage. In return farmers agreed to certain restrictions on sales. In the words of the Administration the purpose of the reserve was to

...maintain U.S. agricultural export preeminence by assuring customers of a dependable source of products, thereby encouraging further growth of overseas markets for U.S. farm goods;...strengthen farm prices when supplies are excessive;...dampen food price gyrations and combat inflation (USDA).

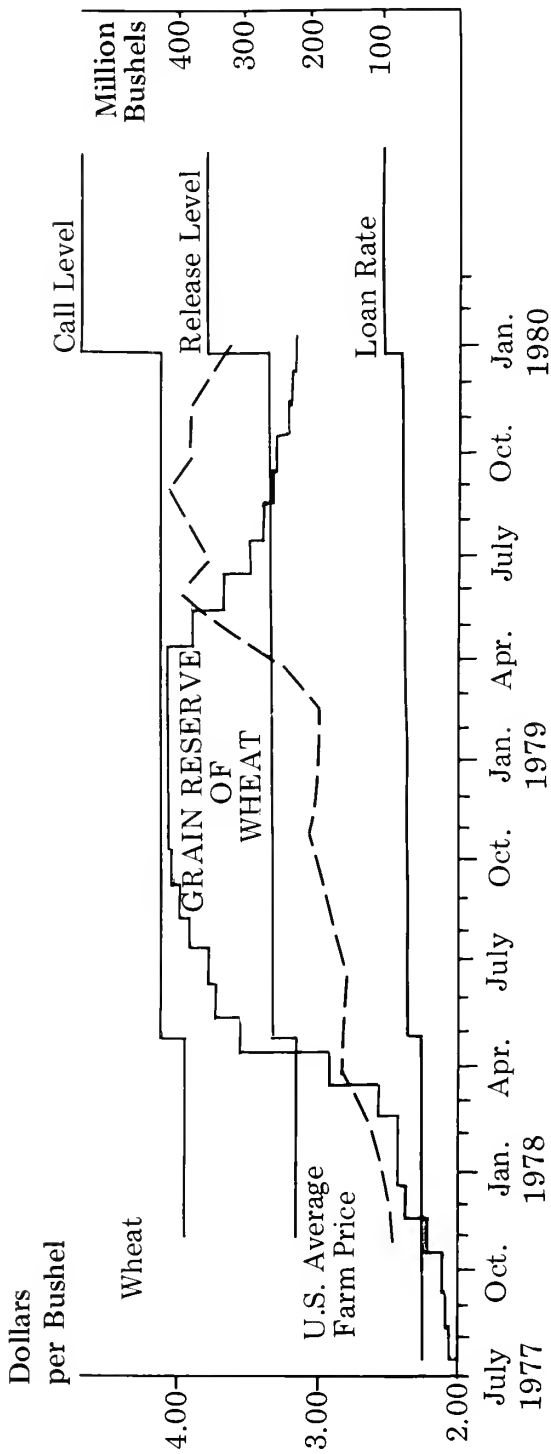
As the name of this program suggests, farmers were the owners of the grain held in the reserve. Once the release price was reached in an upward price movement, all marketing decisions were those of the farmers. They might sell their grain or continue to hold it. The government's role was to make it financially attractive to farmers

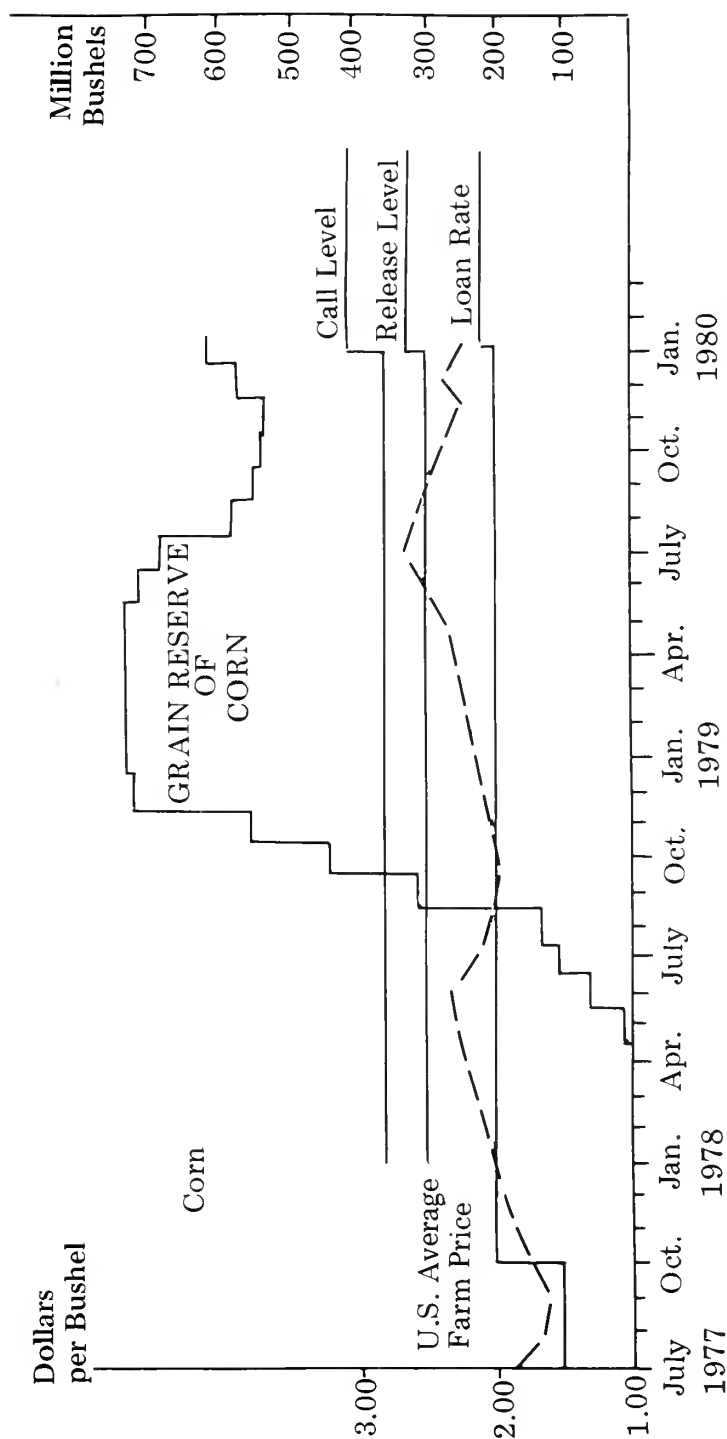
to store grain when market prices were low and to sell when market prices were high and thus induce farmers to make marketing decisions that would even out supplies coming onto the market and to moderate market price fluctuations.³

How successful has this governmentally-sponsored, farmer-owned grain reserve program been in its operations? Between late 1977 and March 1979 farmers placed in reserve some 412 million bushels of wheat, 736 million bushels of corn, and lesser amounts of oats, barley, and sorghum, or about 20 percent of one year's production of wheat and about 10 percent of one year's production of corn. (The operation of the grain reserve program may be viewed graphically in Figure 6.) And this occurred during a three-year period of good to excellent world grain crops. In this context prices received by farmers for wheat in the United States rose steadily throughout 1977-1978, increased moderately in 1978-1979, and rose sharply in 1979, reaching the release price of \$3.29 per bushel in May 1979. Prices received by farmers for corn rose significantly in the first half of the marketing year 1977-1978, declined in the second half of that year, and then turned up again in 1978-1979, reaching the release price of \$2.50 per bushel in June 1979. Rising exports of wheat and corn, in volume terms, contributed to the upward trend in grain prices during the period 1977-1979, as did the removal of significant amounts of wheat and corn from the commercial market through the operations of the farmer-owned grain reserve. On this point all the experts are in agreement.

How much the limited release of wheat and corn stocks from the reserve program in the second half of 1979 contributed to the leveling off of grain prices in that period is subject to debate. Probably the record-breaking grain crop harvested in the 1979-1980 crop year had a greater effect on grain prices in the second half of 1979 than any other single factor. But the release of stocks from the grain reserve likely had some modest influence in the leveling off of grain price increases in the second half of 1979.

In summary, then, one must conclude that the farmer-owned grain reserve program operated in the direction of evening out supplies over time and moderating grain price fluctuations. But it is questionable whether the program has the size, the capacity, and the design to deal with major grain gluts or shortages. The program, as designed, most properly should be viewed as an adjunct to the price support program; it did help support producer grain prices in 1977-1978. But it involves no commitment to stabilize grain prices in accordance with a defined stabilization goal, and it lacks the capacity





Source: Department of Agricultural and Applied Economics, University of Minnesota, 1980.
Figure 6. Grain Reserve Quantities and Prices by Month, 1977-1980.

and the programmatic features to control large upward thrusts in grain prices.

International System of Coordinated National Grain Reserves

The United States pressed hard for an international agreement on grain reserves in 1978-1979 in which individual nations, both importers and exporters, would hold and operate their own individual grain reserve programs in accordance with internationally agreed-upon rules and objectives. If such an international system of coordinated grain reserves could be brought into operation with a total average reserve capacity of some 80 million tons of grain, there is no reason why such an international program could not stabilize world grain prices with a range of plus or minus 10 percent of the agreed-upon stabilization target price in every year except the most extreme shortage or glut situation. The problem with this alternative is obtaining the international agreement.

The United States and 66 other trading nations deliberated from February 1978 to March 1979 under the auspices of the International Wheat Council on the formation of an international system of coordinated wheat reserve stocks. But they could not reach an agreement. They could not agree on a definition of reserve stocks, the target level of stabilization, the rules for the accumulation and the release of stocks, or the procedure for assisting the developing nations to finance the holding of reserve stocks. Thus, the 67 grain trading nations gave up and went home in March 1979.

Since it can be assumed that most, if not all, of the nations involved had a genuine interest in achieving greater price and supply stability on the international grain market, why could they not reach agreement? There are doubtless many specific reasons. But two basic reasons should be recognized. First, many of the nations involved had already developed some specific market arrangements designed to provide them with internal grain price and supply stability that were well suited to other institutional arrangements of their countries, e.g., the variable levy system of the EC, the grain monopoly marketing boards of Canada and Australia, and the National Food Agency of Japan with exclusive monopolistic power to import foodstuffs. Thus, these countries were in no hurry to create new institutional arrangements that they were not sure they needed or that might jeopardize their existing marketing arrangements.

Second, all the nations at the negotiating conference recognized full well that the United States had the strongest interest in achieving

an international system of coordinated grain reserves with the capacity to effectively stabilize world grain prices and supplies. This strong interest on the part of the United States grows out of five related causative elements. The United States wants to be a reliable supplier of grains to the world market at all times. The United States wants a stable domestic level of grain prices that contributes to stable international grain markets. It wants to maintain as free an international trade system as possible. It wants to help feed the poor nations. And the United States wants all grain-trading nations to share in the cost of operating a grain reserve program. This being the case, the other 66 grain-trading nations were inclined to let the United States take the lead in the establishment of and in providing the financial support for a grain reserve program with the capacity to stabilize world grain prices and supplies. But, as of the spring of 1979, the United States was not yet ready to underwrite the principal cost of a world wheat reserve program with the capacity to stabilize world grain prices. So the negotiating conference broke down.

Since the principal provisions were never agreed upon, it is difficult to discuss the economic consequences of an international system of national wheat reserve programs. However, two general conclusions can be reached. First, the country composition of such a system, involving the less developed countries as well as the developed, would have almost certainly insured the establishment of a food security wheat reserve with the capacity to protect the very poor countries against production shortfalls and physical catastrophes. Second, the establishment of an international wheat reserve would have made some contribution to moderating world market price fluctuations in the grains as wheat substituted for coarse grains and rice. But a reserve program in wheat alone would not have been an effective program instrument for stabilizing world grain prices.

U.S. Reserves and Bilateral Agreements—An Innovative Alternative

Is there a way for the United States to be a reliable supplier to its regular foreign customers and maintain a stable domestic grain price level without its operating unilaterally a grain reserve program adequate to stabilize world grain prices? In a technical sense there is a way. That way may be described as follows.

The United States would operate unilaterally a grain reserve program with, say, half the capacity to stabilize world grain prices, that is, a grain reserve that averaged 40 million tons in size. This grain

reserve program could be the present farmer-owned reserve program with certain modifications. Reserve stocks would be accumulated at the loan rate for each category of grain. Grain would be released on the market when the market price reached the now defined release and call prices. But in this proposed program farmers would be required to sell their grain onto the commercial market at a mandatory call price. They would not be permitted to hold their grain and speculate. The ultimate total size of this grain reserve stock program would depend upon the number of, and specific provisions of, various bilateral agreements reached through negotiations as discussed below.

To the proposed reserve program would be attached a network of long-term bilateral agreements. The United States would seek, through negotiations, a bilateral grain agreement with each of its important customer nations. Under the provisions of such an agreement the United States would guarantee to supply the customer nation at all times its historic import quantity of grain, plus some agreed-upon growth factor, at a price no higher than the upper limit of the price stabilization band in effect in the domestic U.S. economy. In turn, the customer nation would agree to build a grain reserve consistent in size with the grain utilization in its economy and operate that reserve program in accordance with the rules of the U.S. reserve program. Countries that did not enter into long-term grain agreements with the United States would not be permitted to purchase grain when the market price reached the upper limit of the price stabilization band. As long as market prices in the United States fluctuated within the defined price stabilization band, all countries would be free to purchase grain from the United States.

The advantages of the proposed program are several in number. First, the United States could launch this worldwide program unilaterally. It need not wait for approval in an international negotiating conference in which the chances of gaining approval are, indeed, slim. Second, as the number of this particular kind of bilateral grains agreement increased, so would the probability of achieving increased stability in the world grain market. Third, the important importing nations would share in the cost of building and operating a grain reserve program with the capacity to stabilize the world grain market. Fourth, such a development would regularize U.S. grain exports and contribute to a rational planning of annual grain production.

There are disadvantages to consider too. First, the development of a network of bilateral grains agreements would further increase

the amount and degree of governmental intervention in the domestic and international economies, considered by many as undesirable. Second, the purpose of the agreement procedure is to discriminate among foreign buyers. Those who had signed agreements would be assured of supplies in periods of grain shortages; those who had not signed would be excluded from the U.S. market during periods of shortages.

The development of a system of bilateral agreements runs counter to the long-standing policy of the United States to seek free trade. The question might be asked: Why would any importing nation wish to enter into a long-term grains agreement with the United States? The answer is that in a period of prospective short supplies in the world those countries would be assured of their historic quantities of grain imports from the United States at a stabilized price. And that could be a strong inducement in the 1980s.

NOTES

1. These and other important trends in the supply and utilization of wheat, coarse grains, and rice may be found in Statistical Appendix Tables.
2. This section draws heavily on the report by Houck and Ryan.
3. For additional detail on the release and call price procedure of the grain reserve program and on the actual prices for the period 1977-1980, see the section titled "Grain Reserves" (page 13) and Table 1 (page 17) in Chapter 1.

REFERENCES

- Burmeister, Edwin. "Is Price Stabilization Theoretically Desirable?" *Stabilizing World Commodity Markets*. F.G. Adams and S.A. Klein, eds. Lexington, Massachusetts: Lexington Books, 1978, pp. 189-91.
- Burnstein, Harlan. *Welfare Implications of Instability in Agricultural Commodity Markets*. Pennsylvania State University, Dep. Agr. Econ. and Rural Soc., AERS-132, October 1977.
- Gustafson, Robert L. *Carryover Levels for Grains*. USDA Tech. Bull. 1178, October 1958.
- Houck, James P. and Mary E. Ryan. *Economic Research on International Grain Reserves: The State of Knowledge*. University of Minnesota, Ag. Exp. Sta. Bull. 532, 1979.
- Massel, Benton F. "Price Stability and Welfare." *Quart. J. Econ.* 83 (1969): 284-98.

- Oi, W.Y. "The Desirability of Price Instability under Perfect Competition." *Econometrica*. 29 (1961): 58-64.
- Samuelson, Paul. "The Consumer Does Benefit from Feasible Price Stability." *Quart. J. Econ.* 86 (1972): 476-93.
- _____. *Foundations of Economic Analysis*. Cambridge: Harvard University Press, 1947, Chap. 7.
- Sarris, A.H. and L. Taylor. "Buffer Stock Analysis for Agricultural Products: Theoretical Murk or Empirical Resolution?" in *Stabilizing World Commodity Markets*. F.G. Adams and S.A. Klein, eds. Lexington, Massachusetts: Lexington Books, 1978, pp. 149-60.
- Smith, G.W. "Commodity Instability and Market Failure: A Survey of Issues." in *Stabilizing World Commodity Markets*. F.G. Adams and S.A. Klein, eds. Lexington, Massachusetts: Lexington Books, 1978, pp. 161-88.
- Turnovsky, Stephen. "The Distribution of Welfare Gains from Price Stabilization: A Survey of Some Theoretical Issues." in *Stabilizing World Commodity Markets*. F.G. Adams and S.A. Klein, eds. Lexington, Massachusetts: Lexington Books, 1978, pp. 119-48.
- Turnovsky, Stephen, Haim Shalit, and Andrew Schmitz. "Consumer's Surplus, Price Instability, and Consumer Welfare." *Econometrica*. 48 (1980), forthcoming.
- USDA. *The Farmer-Owned Grain Reserve Program*. Issue Briefing Paper No. 18. July 20, 1979.
- Waugh, F.V. "Does the Consumer Benefit from Price Instability?" *Quart. J. Econ.* 58 (1944): 602-14.
- _____. "Reserve Stocks of Farm Products." *Agricultural Policy: A Review of Programs and Needs*. National Advisory Commission on Food and Fiber, Vol. V, Technical Papers Section I, August 1967.

7 THE FOOD STAMP PROGRAM

Sylvia Lane

THE CURRENT PROBLEM

The food stamp program, the nation's primary policy tool for the provision of domestic food assistance, has been under continual legislative review since its inception in 1964. Major revisions that will entail its curtailment or even its termination will, in all likelihood, be made in the next few years.

In 1977 and 1978 Congress considered legislation to replace existing federal welfare programs, including the food stamp program, with a single coordinated program to assure employment, training, and income supplementation for low-income citizens able to work. Income support would have been provided for citizens who had incomes below the level considered necessary for a minimally satisfactory level of living and who were not available for work by reason of disability, age, or family circumstance (U.S. Senate, 95th Congress, 2nd Session). In 1979 Congress considered another "welfare reform" package that would have provided cash assistance instead of food stamps for at least some recipients (*Congressional Quarterly Weekly Report*). More recently, the Food and Nutrition Service of the United States Department of Agriculture authorized demonstration projects to test whether providing cash assistance instead of food stamps would affect participation rates among the eligible elderly and their food expenditures and nutritional status.

Although the phasing-out of the food stamp program is under consideration, it is still one of the most important components of

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our public assistance system. Therefore, the policy issue being considered by Congress and addressed in this chapter is whether public assistance should be given in cash or in kind in the form of food stamps (U.S. Senate, 95th Congress, 1st Session, p. 267).

Tullock has clearly argued that from the standpoint of the poor person the receipt of a direct cash payment as a subsidy is superior (in terms of consumer welfare resulting from greater freedom of choice) to a subsidy in kind, and his position is now widely accepted (Clarkson 1975, 1976). The direct consumer benefits of the food stamp program as opposed to a cash assistance program are an increase in the consumption of food (for which benefits vary by individuals) and, for some, an improvement in nutrition. Benefits to food producers are increases in net revenue because of the program-induced increase in the demand for food.

To justify the food stamp program joint benefits to taxpayers, producers, and food stamp program participants must be high enough to offset: 1) program costs, not only in fiscal terms, but in regard to the opportunity cost of participants' time necessary for applying for and obtaining food stamps, and the program-induced distortions in the allocation of resources in the overall economy, 2) participants' loss of utility since they legally can only buy food with the added income, and 3) participants' and nonparticipants' welfare losses resulting from higher food prices and the distortion in the quantities of food and nonfood in consumption packages relative to consumption preferences.¹

HISTORICAL PERSPECTIVE

The current food stamp program evolved from earlier attempts in the United States to dispose of agricultural surpluses by providing food to the needy. The first of these was the Federal Surplus Relief Corporation's purchase of surplus farm commodities for distribution to the unemployed and their families in the depression years between 1933 and 1938. It was followed by a food stamp program that was in effect briefly between 1939 and 1942 and was terminated when agricultural surpluses and unemployment vanished because of World War II. Surpluses reappeared after the war. Consequently, the Agricultural Act of 1949 authorized a food distribution program that made surplus food available to local governments for distribution to those in need. When, in conjunction with the war on poverty, emphasis shifted to eliminating hunger, a second food stamp program

was enacted in 1964. It followed pilot studies authorized by Executive order in 1961, which indicated that the nutritional status of low-income households improved if they received food stamps. The 1964 Act declared it to be a policy of Congress "to raise the levels of nutrition among low income households" (U.S. Congress).

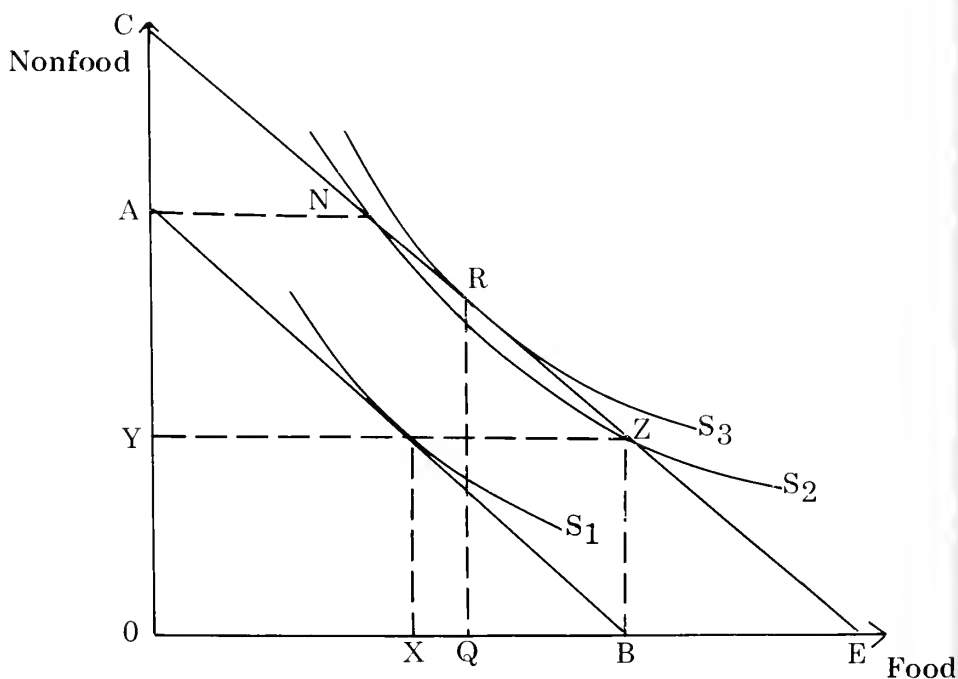
Amendments, in 1971, to the Food Stamp Act of 1964, provided for increased benefits and national eligibility standards. Food coupon allotments changed from levels that provided recipients an "opportunity more nearly to obtain a low-cost nutritionally adequate diet" to the "opportunity to obtain a nutritionally adequate diet" (U.S. Congress). National eligibility standards were based on need and not on characteristics of participating household.² Implementation of a nationwide food stamp program by July 1974 was mandated in the Agriculture and Consumer Protection Act of 1973 (U.S. Congress). The Food and Agriculture Act of 1977 tightened eligibility standards to reduce program costs, eliminated the purchase requirement (by 1979) to encourage participation, and extended the program's authorization until 1981 (Public Law 95-113).³ The three major reasons why program participation and consequent program costs have increased over the years have been increases in program benefits, increases in unemployment, and the extension of program availability to new project areas (Hines, MacDonald).

THEORETICAL FRAMEWORK

The food stamp program expands the demand for food by providing eligible households with additional purchasing power, which can only be used to buy food. The value of the food stamp allotment i.e., the "bonus stamps," which households currently participating in the program receive, equals the cost to such households of the "thrifty food plan" less an amount equal to 30 percent of the households' income as computed for food stamp program eligibility. The minimum allotment for one or two person households is \$10 a month. Of course, bonus stamps may "free up" income that would have been spent for food, and that income may be spent on other commodities. Some of this "freed up" income may be spent on additional food. Bonus stamps do not all have to be used, but this loss of potential food consumption is probably small. Food stamp program recipients, who, in view of prices, prefer to spend a smaller proportion of their real income (money income plus bonus stamps) on food and a larger proportion than estimated by policy makers on other commodities may do so.

In Figure 7 there is depicted food consumption of OX and nonfood consumption of OY at a utility level of S_1 , under conditions of no food stamp assistance. With a food stamp program and a purchase requirement, food consumption increases to OB and nonfood remains unchanged, producing a higher utility level S_2 . However, with bonus stamps and no purchase requirement, consumers may choose to substitute some food purchases, QB, for nonfood, thereby reaching a higher level of utility S_3 .⁴ Theoretically, increases in households' disposable income (food stamps serve as an increase in households' disposable real income), if spent on nutritious foods, should increase nutritional intake.⁵

Food stamp program participants theoretically will buy more food not only because food stamps can only be used to buy food, and bonus stamps give them additional purchasing power, but because both the income effect and the substitution effect will be



Source: Adapted from Sullivan.

Figure 7. Comparison of the Consumption Effects Between a Food Stamp Program With and Without a Purchase Requirement and the "Cash Out" Alternative.

operative. The income effect, i.e., the observed tendency for people to buy more when they have higher incomes (income elasticity of demand greater than zero), is relevant since program participants' incomes are increased. This effect is small for the average consumer because food has an income elasticity of demand of less than one. However, this varies greatly by income levels; i.e., a lower proportion is purchased out of higher incomes and a higher proportion out of lower incomes. Engel's Law states that as income increases, the proportion spent on food decreases. Stated differently, the marginal propensity to buy food or the proportion of additional income that will be spent on food is lower the higher the income level. Thus, there are proportionately higher food purchases by low income consumers when their incomes are increased, e.g., by food stamps.

The substitution effect will also act to increase the food purchases of food stamp program participants because, since they are using food stamps, food becomes relatively cheaper than other commodities they purchase. They will, therefore, substitute food for other purchases in order to increase utility derived from their total expenditure for a particular period (budget). Thus, a food stamp program should increase the quantity of food demanded and the price of food (see Figure 8).⁶

An increase in the price of food not only impacts on farm producers but also impacts on producers of production inputs, e.g., energy. This could cause slight increases in input quantities demanded. However, since price elasticities of both the supply and demand for food at retail (as they are for farm inputs) are relatively low (Figure 8), the effects of additional demand occasioned by the program on the retail price of food and on farm inputs are probably amplified.⁷

EMPIRICAL RESEARCH

Food Stamp Effects on the Retail Sector and Farm Income

The food stamp program in the United States emerged as a response to concerns about the level of farm income, which was thought to be relatively low, and about hunger and malnutrition among the poor. Thus the program may be evaluated in the light of its effects in these areas of concern.

In the period 1960-1976 per capita disposable income of the farm population rose from 54 percent to about 78 percent of nonfarm

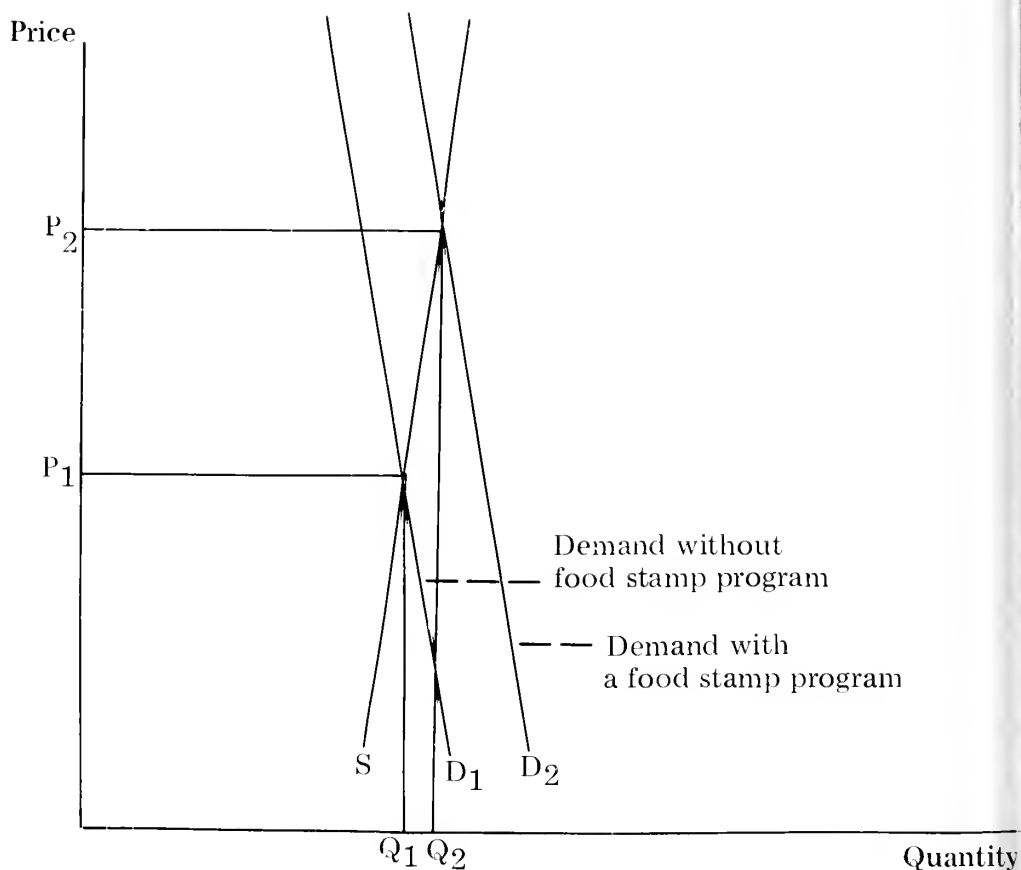


Figure 8. Effect of Food Stamp Program on the Quantity Demanded and Price of Food at Retail.

disposable income per capita (U.S. Department of Commerce). How much did the food stamp program contribute to this improvement? In 1975, the peak year for food stamp program participation, the total value of food stamps in circulation represented about 4.4 percent of \$185 billion, the total expenditure on food, or approximately \$8.1 billion. Approximately \$4.9 billion of that was in bonus food stamps issued in that year, representing an implicit increase in food expenditure not available before implementation of the food stamp program. But since the best available estimates are that only between 30 to 57 percent of the income received as bonus stamps is used to purchase additional food (Nelson and Perrin 1976; Stucker;

Schrimper), the increased demand for food generated by the food stamp program for that year may be estimated as approximately \$1.5 to \$2.8 billion. The current food stamp program's \$5.8 billion in bonus stamps adds about \$2.3 billion (based on the approximate average of 40 percent of bonus stamps being spent on additional food) to retail food purchases of low income households. This means an increase in food expenditures by these households of less than 8 percent. To calculate the net increase in retail food expenditures, one has to subtract about \$500 million (Nelson and Perrin 1976, 1978) of reduced food expenditures by higher income households, who are taxed to pay for the program.

The farmer's share of retail food expenditures, in 1975, was liberally estimated at 42 percent.⁸ Therefore, the addition to farm income in 1975, as a result of the food stamp program, was approximately \$.6 to \$1.2 billion, representing approximately 1 percent of the gross farm income in that year (U.S. Congress; Stucker).

In 1978 total food expenditures were estimated to be \$220 billion. Stamps distributed under the food stamp program were valued at \$7.5 billion, i.e., 3.4 percent of the total 1978 food expenditures (Stucker). This included the stamps issued that had to be purchased by food stamp program participants and the additional expenditure on food from additional real income generated by bonus stamps.

With reference to the effects of increased food sales on food prices, by food groups, a recent study shows "that the food stamp program has likely had a statistically significant but rather small positive influence on the prices for most food groups, other things remaining constant" (Boehm and Belongia, p. 7). Meats, cereals, and bakery products prices were especially influenced. Schrimper found that each 10 percent increase in participants' demand for food might result in an 0.08 to 4.0 percent increase in food prices, depending on the price elasticity of the retail supply for food and the share of the total food market accounted for by program participants.

Additional Effects on the Economy

To assess the food stamp program's effects on the United States economy, Nelson and Perrin made a study, assuming a closed economy, utilizing an input-output model to estimate impacts of transfers of stipulated amounts of income from taxpayers to food stamp program participants. The assumption was made that federal taxes of the nonparticipant household sector were increased, and the sector's

disposable income similarly decreased, by an amount equal to the value of the bonus stamps issued in fiscal years 1974 and 1976 (Nelson and Perrin, 1978).

Table 6 presents the estimated increased business receipts (output) and gross national product generated during fiscal year 1976 by the injection of \$5,313 million of bonus stamps. On the basis of previous studies, Nelson and Perrin assumed 55 percent was spent for food and 45 percent for nonfood items. Under these assumptions, business receipts rose about \$2.3 billion more than if there had been no program, and gross national product grew by \$838 million. Increased output was associated with an increase in the number of jobs needed to meet the increase in final demand. In 1974 there were an estimated 76,561 more jobs with the program than there would have been without it. Table 6 also contains data pertaining to the 1976 program, assuming elimination of a purchase requirement. Business receipts would have increased by \$544.4 million and the GNP by \$306.5 million under these assumptions. However, price effects were not considered in this study. Higher retail food prices may have, through their effect on wages, served to reduce aggregate output and through their effect on factor supply prices, reduced exports.

There is also a structural impact of the program on the food retailing sector. The smaller stores benefit proportionately more from the food stamp program in terms of absolute dollars (Nelson). A study by Nelson and Perrin (1976b, p. 1005) of the food stamp program's effects throughout the economy (Table 6) leads to the conclusion that "the program's impact upon patterns of resource allocation is of sufficient magnitude to merit particular consideration in policy deliberations . . .," especially those concerned with the price of food.

Effects on Nutrition

The question of whether the food stamp program has improved the nutritional quality of diets of low income households does not have a simple answer because the expansion of food consumption does not necessarily imply an improved level of nutrition. Several studies have been addressed to this subject. West and Price found "bonus food stamps significantly increase the [dollar] value of food consumed" (p. 728). Lane stated that "the programs (the food stamp program and the food distribution program) apparently affect nutrition through increasing the amount of food available to participants and through increasing real income, part of which was spent on

Changes in Business Receipts by Industry Sector from Bonus Stamps ^b		
	With Purchase Requirement	Without Purchase Requirement
	..... thousands of dollars	
Agriculture, Forestry, and Fisheries	796,772	244,815
Mining	-16,552	13,164
Construction	-10,548	16,334
Manufacturing		
Food manufacturing		
Meat and poultry products	562,342	82,219
Dairy products	200,503	4,929
Grain mill products	174,832	30,442
Bakery products	115,520	492
Canned and preserved foods	336,051	70,073
Other foods and beverages	191,370	-118,733
Total	1,580,618	72,422
Nonfood manufacturing	-551,894	-195,026
Total manufacturing	1,028,724	-122,604
Local and Suburban Transportation	-6,876	17,713
All Other Transportation	-10,813	-55,530
Communications	-30,344	13,879
Gas, Electric, Water, and		
Sanitary Utilities	-1,246	197,706
Wholesale Trade	486,811	-100,989

Table 6. Estimated Changes in U.S. Business Receipts and Gross National Product with Income Transfer from Taxpayers to Food Stamp Households, Fiscal Year 1976^a (continued)

Changes in Business Receipts by Industry Sector from Bonus Stamps ^b	
With Purchase Requirement	Without Purchase Requirement
..... thousands of dollars.....	
Retail Trade	315,713
Finance, Insurance, and Real Estate	147,716
Personal Services	-62,442
Physicans and Dentists	880
Hospitals and Laboratory Services	111,987
Education (Private)	-30,586
Other Sectors ^c	-163,351
Total change in business receipts	544,405
Changes in Gross National Product (GNP) from Bonus Stamps	
With Purchase Requirement	Without Purchase Requirement
..... thousands of dollars.....	
Participant Household Sector	
Bonus stamps received	5,313,000
Plus income from new jobs	31,854
Minus increase in savings and taxes	415,485
Equals change in consumption expenditures	4,929,983

Nonparticipant Household Sector
 Income received from new jobs
 Plus decrease in savings and taxes
 Minus tax to fund bonus stamps
 Equals change in consumption
 expenditures

548,268
 417,235
-5,313,000
 -4,347,497

189,683
 499,824
5,313,000

-4,623,493

Sum of Change in Consumption
 Expenditures Equals Changes in GNP

838,062
 306,490

^aThe nonparticipant household sector was taxed \$5,313 billion to fund bonus stamps. The expenditure of bonus stamps was treated as an increase in final demand of this amount. Meeting this increase in final demand required additional economic activity. This increased economic activity resulted in a contribution to gross national product of \$838,062 million for fiscal year 1976, when households which participated had to buy stamps to participate. The simulation for the ending of the requirement to purchase stamps yielded a corresponding figure of \$306,490 million.

^bAs a result of the injection of bonus stamps, the final demand for the products and services of some sectors rose more than it would have risen without the program. Agriculture, forestry, and fisheries, for example, received \$796,772 million more in business receipts (output) than without the program. For other sectors, output was less than it would have been without the program. Mining, for instance, would have received \$16,552 million more in business receipts without the program.

^cOther sectors is an aggregate composed of direct and transferred imports; business travel and gifts; office supplies; federal, state, and local government enterprises; and other services.

Source: Nelson and Perrin 1978.

Table 7. Distribution of Food Expenditures for Sample of Food Stamp Program Participant and Nonparticipant Households, 1974

Food Item	Food Stamp Households	All Other Households
	.....percent.....	
All Meat Products	36.5	36.3
Beef and veal	12.2	15.4
Pork	10.8	8.7
Poultry	6.4	4.7
Other	7.1	7.5
Dairy Products	13.8	13.7
Milk and cream	10.5	8.8
Other	3.3	4.9
Eggs	3.5	2.6
Fruits and Vegetables	13.7	14.2
Flour and Cereal Products	5.2	3.2
Bakery Products	7.7	8.7
Fats and Oils	3.3	3.0
Sugars and Sweets	2.7	3.0
Snacks	0.6	1.5
Nonalcoholic Beverages	7.1	7.2
All Other	5.9	6.6
	100.0	100.0

Source: Boehm and Nelson, 1978a.

additional food'' (p. 114). O'Connor, Madden, and Prindle in appraising the effect of the negative income tax experiment on the North Carolina sample found strong evidence that receiving additional income had beneficial effects on the overall quality of low-income recipients' diets. Recipients used the additional income to acquire foods containing nutrients in which their diets were deficient. However, receiving additional income had no effects on the quality of recipients' diets in the Iowa sample. It was found that these recipients represented a higher income group.

When food stamp users' shopping habits were compared with those of nonstamp users, it was found that apparent differences in food purchasing patterns were primarily a result of previously-established shopping habits rather than a result of the increase in purchasing power afforded by the bonus coupons (Logan and De-

Loach). Food purchasing patterns are influenced more by age and education levels than by income, according to this study. A final judgment about program effectiveness in improving diets is not possible but "evidence on the dietary consequences of the food stamp program supports the conclusion that the nutritional objectives of the program are generally not being satisfied and that the program in fact makes little positive contribution to diet improvement" (Clarkson 1975, 1976). Apparently food stamps only result in nutritional improvement when there is not enough money to buy food, but this only applies to the lowest income groups (Lane; Madden and Yoder). Madden found no significant difference in the nutritional adequacy of diets between participants and nonparticipants until two weeks after payday when they no longer had enough money to buy food; then, food stamps made a difference.

The program does virtually nothing to change dietary habits. On the other hand, allegations that the stamps are being used to purchase non-nutritious foods or more expensive convenience products do not seem to be justified. "Available evidence now indicates that food stamp households allocate their food budgets in about the same way as do other households" (Boehm and Nelson, 1978a, p. 10). (See Table 7.) Food stamp households, according to this study, spent a higher percentage for fresh milk, cream, pork, poultry products, flour, and cereals and a lower percentage for snacks. Thus, MacDonald's conclusion that "more direct intervention to change the nutritional efficiency of low-income households is needed" has to be regarded with caution. A study by Bivens and Abdel-Ghany suggests nutritional efficiency decreases as income rises. Low-income households were found to be more nutritionally efficient, i.e., acquired more nutrients for every dollar spent.

POLICY ALTERNATIVES

The two policy alternatives currently before Congress are the continuance of the current program and the cashing out of food stamps in conjunction with the passage and implementation of a welfare reform program providing public service employment and income supplements.

Continuation of the 1977 Act

The net effect of continuing the present program as compared to having no food stamp program would be: 1) a slight increase in farm (approximately 1 percent) and food industry income, especially as program participation increases due to an increase in unemployment, 2) a slight increase in food consumption, and 3) the alleviation of hunger among some low income consumers. Effects on nutrition are likely to be positive for the lowest income groups.

The program serves well as an income supplement program, and is available to low-income families not eligible for other forms of categorical welfare. It also supplements AFDC payments in low aid-for-dependent-children-payment-level states (U.S. Congress).

Because it increases food consumption the program does increase the demand for food. Food prices are increased slightly for all consumers, and consequently wage demands are increased. The export market may also be marginally affected in an adverse way by the higher prices. The Treasury burden has been fairly constant, with the food stamp program operating in 1975-1979 at a public outlay of \$5 to \$6 billion annually, or 1 percent of the federal budget (Statistical Appendix Table 16).

"Cashing Out" of Food Stamps in Conjunction with Welfare Reform

The net effect of phasing out the food stamp program and adopting a welfare reform package that includes a jobs and cash assistance program would depend on the eligibility and benefit provisions of the new legislation. If the "Better Jobs and Income Program" proposed in 1977 by the Administration had passed, families of four with over \$4,200 in annual income (and other households with corresponding income characteristics) and eligible for food stamps would have lost their bonus stamps benefits. This would have applied to about 20 percent of those eligible at that time for food stamps, generally those with higher levels of income.

Some 49 percent of households receiving only food stamps as a welfare benefit in 1977 and 50 percent of those receiving both food stamps and cash assistance would have had their public assistance benefits increased, according to Congressional Budget Office estimates. Some 36 percent (28 percent receiving only food stamps and 8 percent receiving food stamps plus cash assistance) would have had public assistance benefits reduced. The gainers would have outnumbered

bered the losers. In addition, the tax burden associated with this specific public objective would have been lessened, and the added food demand and farm income marginally reduced. Concomitantly, those still eligible for continued welfare benefits would have experienced complete choice in income use, allowing for the optimization of utility.

The impact on food expenditures of passage of a program like that proposed, with elimination of the food stamp program, has been estimated by Boehm and Nelson. They found aggregate food expenditures and the farm value of domestically produced foods largely unaffected. Aggregate farm income would have been reduced by about \$100 million as a result of the estimated three-tenths of a billion dollar reduction in aggregate retail expenditures on food. The increased level of funding under the proposal explains this finding.

No Stamps but Targeted Assistance—An Innovative Alternative

The third alternative would include: 1) elimination of the food stamp program, 2) minimal income supplementation through either a negative income tax or the supplemental security income program for those who cannot afford a nutritionally adequate diet, and 3) efforts to improve nutrition through nutrition education programs and targeted food assistance programs, such as the Special Supplemental Food Program for Women, Infants, and Children or the School Lunch Program. This is the most cost-effective approach to improving the nutritional status of those whose health and productivity are likely to be affected by poor nutrition. Lower income recipients' diets would probably tend to improve only slightly with either of the income supplement approaches unless the funds were budgeted throughout the year, since evidence suggests those families seldom budget food expenditures (Madden and Yoder). Targeted food assistance programs would tend to have positive effects on nutrition (Sexauer).

The net effect on food consumption and farm income of such a policy would depend on its eligibility and benefit provisions and the extent of nutrition education. However, it is likely that a carefully designed and targeted food policy would provide as much or more improvement in average nutrition, as great an increase in food expenditures, and as much protection to farm income as either of the other two alternatives. Due to the income supplementation involved, the

Treasury cost should be no greater than that of the second alternative, but more than that entailed by continuation of the present policy.

NOTES

1. Joint benefits to taxpayers, producers, and program participants from any cash assistance program enacted would also have to be high enough to offset fiscal and other program costs in order to justify the program.
2. Currently, participation in the food stamp program is limited to those households whose: 1) net incomes (after a set standard deduction, a 20 percent earned income deduction, and a deduction for dependent care and shelter costs limited to about 50 percent of income) are below nonfarm income poverty guidelines of the federal government, and 2) financial assets do not exceed \$1,750, or, in the case of a household consisting of two or more persons, one of whom is 60 and over, \$3,000 (Public Law 95-113, pp. 692-694). Physically and mentally fit members of households receiving food stamps must register and accept suitable employment, if it is offered, unless responsible for the care of dependent(s) or unless they are students attending school more than half time (Public Law 95-113, pp. 965-966).
3. The increase in participation and the cost of the program are depicted in Statistical Appendix Table 17.
4. AB is the budget constraint before the allotment of "bonus stamps" is received or in the absence of a program (Figure 7). The optimizing household will choose the quantity of food and nonfood, for example, OX and OY, where the marginal rate of substitution of food and nonfood (the slope of indifference curve S_1) equals the price ratio for food and nonfood, i.e., the slope of AB.

CE would be the budget constraint if bonus food stamps were conceived of simply as additional income. However, since the bonus stamps valued at XB constrain that amount of income to food purchases, the feasible consumption set, under the present program, is bounded by ANE. If there was no substitution of nonfood for food commodities, the household would continue to consume OY of nonfood but would consume OB of food, or be at point Z. The household is then on a lower indifference curve (S_2) than if it were optimizing at R. S_3 is the highest indifference curve it can reach. If the marginal rate of substitution of food for nonfood is not equal to the price ratio at Z ($MRS_{F/NF} \neq P_F/P_{NF}$) ($S_3 > S_2$), the recipient becomes better off, i.e., derives more utility, by reducing food consumption from Z to R (Sullivan). From the recipient's viewpoint there is no "waste" at R since he or she may allocate income, including bonus stamps, in accordance with his or her preferences.

The cash-out alternative places the recipient along CE and he or she will, in every case, optimize at R where the slope of S₃ equals the slope of CE, or the same point as with the current bonus stamp program. They would have differed under any bonus program that issued a stamp value in food greater than OQ.

5. MacDonald explains the theoretical effect of the program on nutrition using the formula:

$$N = \left(\frac{N}{E}\right) \left(\frac{E}{Y}\right) Y$$

where N measures the nutritional intake of the household, E is total expenditure on food, and Y is disposable income. $\frac{N}{E}$ is a measure of household nutritional efficiency (units of nutrition per dollar of food expenditure), and $\frac{E}{Y}$ is the household's average propensity to consume food.

6. In Figure 8 the equilibrium quantity consumed is Q₁ at price P₁, with demand D₁. Because of the food stamp program, demand increases to D₂, and then the equilibrium quantity increases to Q₂ at price P₂. To estimate the effects of a food stamp program on quantity demanded and the price of food to the consumer it is necessary to estimate the price elasticity of supply and demand at the retail level. With knowledge concerning the elasticities, the following equation, assuming market-clearing prices, may be used to estimate the percentage change in the retail price of food occasioned by the program (Schrimper).

$$(1) EP_R = (\eta - \epsilon)^{-1} EQ_R$$

where

EP_R = percentage change in retail price of food

EQ_R = percentage change in retail demand for food induced by the food stamp program

η = price elasticity of retail supply of food, and

ε = price elasticity of retail demand for food.

The change in retail demand occasioned by the food stamp program is estimated from the equation:

$$(2) EQ_R = \lambda EB$$

where

λ = share of total retail food market accounted for the food stamp program participants, and

EB = percentage increase in retail food demand for program participants.

7. The price elasticity of the demand for food consumed in the United States has been estimated as -.25 (Mann and St. George). No estimate has been found of the price elasticity of the supply of food at retail, but it is assumed to be relatively inelastic (Heimstra).
8. Identifying and estimating the farmer's share of the food dollar is a relatively difficult task (Boehm and Belongia, 1978a, pp. 13-14). Depending on the definition of "food" and related expenditures, the farmer's share ranged from 26 percent to 39 percent in 1978. It was estimated to be 42 percent in 1975 (U.S. Congress).

REFERENCES

- Benus, J., J. Kmenta and A. Shapiro. "The Dynamics of Household Budget Allocation to Food Expenditures." *Rev. Econ. and Stat.* LVIII(1976): 129-138.
- Bivens, Gordon E. and Mohamed Abdel-Ghany. *Low Income Households' Nutritional Adequacy and Food Spending Efficiency*. Tech. Rep. 15, School of Home Economics, The University of North Carolina at Greensboro, 1976.
- Boehm, W.T. and M. Belongia. "The Farmer's Share: A Summary of Statistical Measures." *National Food Review*—3 USDA-ESCS, 1978a, pp. 13-14.
- _____. "The Food Stamp Program and Its Impact on the Price of Food." USDA-ESCS, 1978b, processed.
- Boehm, W.T. and P.E. Nelson. *Current Economic Research on Food Stamp Use*. USDA-ESCS 37, 1978a.
- _____. "Food Expenditure Consequences of Welfare Reform." *Agricultural-Food Policy Review*. USDA-ESCS AFPR-2, 1978b, pp. 45-50.
- Boehm, William T., Paul E. Nelson, and Kathryn A. Logan. "Progress Toward Eliminating Hunger in America." USDA-ESCS, Agr. Econ. Rep. 446, 1980.
- Clarkson, Kenneth W. *Food Stamps and Nutrition*. Washington, D.C.: American Enterprise Institute for Public Policy Research, Evaluation Studies 18, 1975.
- _____. "Welfare Benefits of the Food Stamp Program." *Southern Econ. J.* 43(1976):864-878.
- Congressional Quarterly Weekly Report*. July 26, 1979, p. 1024.
- Heimstra, Stephen J. "Evaluation of Effectiveness and Efficiency in Food Programs." *Agricultural-Food Policy Review*. USDA-ESCS AFPR-2, 1978, pp. 109-114.
- Hines, Fred K. *Factors Related to Participation in the Food Stamp Program*. USDA-ERS Agr. Econ. Rep. 298, July, 1975.
- Hymans, S. and A. Shapiro. "The Allocation of Household Income to Food Consumption." in *5,000 American Families—Patterns to Economic Progress*. Vol. 2, Institute for Social Research. Ann Arbor: University of Michigan, 1974.
- Lane, S. "Food Distribution and Food Stamp Program Effects on Food Consumption and Nutritional 'Achievement' of Low Income Persons in Kern County, California." *Amer. J. Agr. Econ.* 60(1978):108-116.
- Logan, S.H. and D.B. DeLoach. *The Food Stamp Program: Del Norte and Humboldt Counties, California*. Univ. of Calif. (Davis) Agr. Exp. Sta. Bull. 860, 1973.
- MacDonald, M. *Food Stamps and Income Maintenance*. New York: Academic Press for Institute for Research on Poverty, University of Wisconsin-Madison, 1977.
- Madden, P.J. and M.D. Yoder. *Program Evaluation: Food Stamps and Commodity Distribution in Rural Areas of Central Pennsylvania*. Pennsylvania Agr. Exp. Sta. Bull. 780, 1972.

- Mann, Jitendar and G.E. St. George. *Estimates of Elasticities for Food Demand in the United States*. USDA ESCS Tech. Bull. 1580, 1978.
- Nelson, P.E. *Food Stamp Redemptions: Their Impact on Food Sales by Region, Size and Kind of Participating Food Stores—Fiscal 1976*. USDA-ESCS Agr. Exp. Rep. 410, August 1978.
- Nelson, P.E., Jr. and J. Perrin. *Economic Effects of the U.S. Food Stamp Program, Calendar Year 1972 and Fiscal Year 1974*. USDA-ERS Agr. Econ. Rep. 331, July, 1976a.
- _____. "Effects of the U.S. Food Stamp and National School Lunch Programs, Fiscal Year 1974." *Amer. J. Agr. Econ.* 58(1976b):1000-1005.
- _____. "Economic Effects of the Food Stamp Program." *Agricultural-Food Policy Review*. USDA-ESCS AFPR-2, 1978, pp. 89-94.
- O'Connor, J. Frank, J. Patrick Madden and Allen M. Prindle. "Nutrition." in *The Rural Income Maintenance Experiment: Summary Report*. U.S./N.E.W. Processed. Nov 1976.
- Public Law 95-113, 91 STAT., September 29, 1977, pp. 692-694, 926-964, 965-966.
- Schrimper, R.A. "Food Programs and the Retail Price of Food." *Agricultural-Food Policy Review*. USDA-ESCS AFPR-2, 1978, pp. 101-107.
- Sexauer, Benjamin. "Food Programs and Nutritional Intake: What Evidence?" *Agricultural-Food Policy Review*. USDA-ESCS AFPR-2, 1978, pp. 39-43.
- Stucker, Thomas, Section Leader, Food and Nutrition Policy Research Section, USDA-ESCS. Letter Dated February 13, 1980.
- Sullivan, D.H. "A Note on Food Stamp Reform." *Amer. J. Agr. Econ.* 58(1976): 560-562.
- Tullock, G. "Subsidizing Housing in a Competitive Market: Comment." *Amer. Econ. Rev.* 61(1971):218-219.
- USDA. "Food Consumption of Households in the United States: Seasons and Years, 1965-66." USDA-ARS Rep. 12, 1972.
- U.S. Department of Commerce. *Social Indicators, 1976*. Office of Federal Statistical Policy and Standards, Bureau of the Census. U.S. G.P.O., Washington, D.C., 1977.
- U.S. Congress, Congressional Budget Office. *The Food Stamp Program: Income or Food Supplementations*. Budget Issue Paper, Washington, D.C.: U.S. G.P.O., 1977.
- U.S. Senate, 95th Congress, 1st session. *Food and Agricultural Act of 1977*. Report of the Committee on Agriculture, Nutrition, and Forestry to Accompany S.275. Washington, D.C.: U.S. G.P.O. May 16, 1977.
- U.S. Senate, 95th Congress, 2nd session. *Hearing before the Committee on Human Resources on S-2084, Better Jobs and Income Act, 1978*. Washington, D.C.: U.S. G.P.O., March 22-23, 1978, pp. 6-66.
- West, D.A. and D.W. Price. "The Effects of Income, Assets, Food Programs, and Household Site on Food Consumption." *Amer. J. Agr. Econ.* 58(1976): 725-730.

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SUMMARY

U.S. price and income policy has been evolving for over half a century for the food and agricultural sector. That policy has gradually expanded to encompass a wider array of problems and to attract a broader participation of interest groups. Agricultural and food policy is not only of interest to farmer organizations but also of concern to consumer groups, exporters, taxpayers, agribusinesses, and rural communities. This stream of public policy has been in response to a variety of problems, including the economic welfare of farmers, the food supply for consumers, agricultural trade, and food assistance—both domestically and abroad. The current policy is embodied in the Food and Agriculture Act of 1977, which is set to expire December 31, 1981.

This publication provides analyses to be used by policy makers and other citizens alike as they deliberate and decide what kind of public policy is desired to meet the food and agricultural problems of the 1980s. Research reported herein was designed to provide objective, reliable information and does not propose or advocate any particular policy. It is a synthesis and interpretation of the existing body of knowledge germane to this policy area.

The analyses include several integrated sections. Trends in the relevant background data for the past two decades critical to policy analysis appear in the Statistical Appendix and are presented in terms of both yearly times-series (current and constant 1972 dollars) and compound rates of change. Aggregate farm output has risen rather consistently. Farm productivity per worker hour in the farm sector has outpaced that of the nonfarm. Farm product prices have not kept pace with prices paid by farmers, nor by consumers, except during the early 1970s. Although gross income to farm families has risen rapidly, particularly during the early 1970s, the growth in net farm income in constant dollars has been much slower, with income from nonfarm sources becoming more prominent. The value of farm physical assets has grown rather dramatically, both in cur-

rent and constant dollar terms. However, the growth was much higher in the 1960s than in the 1970s. The growth, in both assets and size, is most pronounced for the larger farms. Agricultural exports and the net trade balance have risen substantially, even in constant dollar terms, and particularly in the 1970s. Federal domestic food assistance outlays have also risen substantially in current dollars, particularly during the late 1960s and early 1970s, but they have slowed considerably in constant dollars in the late 1970s.

The first chapter analyzes the economic and political environment underlying the Food and Agriculture Act of 1977, its provisions, and its implementation. Influential factors affecting the development of the 1977 Act were the unique national and foreign food shortages, oil crises, and changes in international currency exchange rates, all of which pushed prices of most commodities, particularly agricultural and mineral, to record levels during a short, temporary period of 1972-1974. The 1977 Act represented yet another installment in the evolution of several policy thrusts. It combined previously separate programs concerned with farm commodities, foreign food aid, domestic food stamps, and agricultural research and education, to which was added a domestic farmer-owned grain reserve.

Analyses in the remaining chapters focus on six continuing problem areas: farm prices and income, agriculture and food prices, agricultural trade, structural changes in farming, grain reserves, and food stamps. For each of these policy problems, an analysis is made of the characteristics of the problem, the relevant theoretical and empirical knowledge, pertinent recent trend data, and several policy alternatives.

Each of the policy alternatives could be a logical public response to the problem and was selected to provide a useful sample of a wide range of possible courses of action. For each problem, one innovative—usually untried—alternative is presented. For most of the problems, three additional policy alternatives are presented, namely: continuation of the 1977 Act, compensatory payments, and effective production control options. Following a characterization of these alternatives by the policy instruments appropriate for their implementation, the expected economic consequences for producers, consumers, international traders, and taxpayers are analyzed and compared.

The analysis of each of the various problems produced findings which should be important to future policy decisions. They can be briefly summarized as follows. Increased farm and food price variability during the past decade, while moderated somewhat by the

1977 Act, will attract continued public policy attention if farm income and consumer food supplies are to be protected in the presence of further technological change, highly inelastic product demand, and growing dependence on foreign markets. Future farmer and consumer welfare is also increasingly affected by those policy decisions which impact on the livestock sector. Livestock products now represent a larger share of the family budget. Also the changing structure of the livestock industry makes it increasingly susceptible to a volatile world grain market. Although the type of policies represented by the 1977 Act have probably had minimal effect upon the persistent structural change in agriculture toward greater concentration, future policy decisions could be designed to alter the organization of the agricultural and food system.

With the dramatic rise in this nation's dependence upon world agricultural trade and that in turn often being largely managed by the government of each country, future policy makers face major decisions that could substantially alter the structure and management of our foreign trade. This nation's first government subsidized farmer-owned grain reserve, launched by the 1977 Act, is yielding useful data for research and future policy. While the body of knowledge about national and international food reserves is expanding, the form, size, and management of a future grain reserve policy will likely be a dominant policy issue in the 1980s. Finally, the food stamp program has undergone rapid expansion in the past decade, as well as intensive policy review, which culminated in the removal of the purchase requirement in the 1977 Act. Public decisions in the near future may result in a substantial alteration, curtailment, or even termination of the current food stamp program.

This systematic analysis of the current problems, discussion of possible policies—some tried and some new—and their likely results to various interest groups in the economy provide researchers and policy makers with additional knowledge to help choose food and agricultural policy for the 1980s.

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GLOSSARY OF SELECTED TERMS

- Acquisition cost** The price for any resource paid by an owner at the time of purchase, usually referring to relatively fixed resources which are used over an extended or indefinite time period.
- Buffer stocks** Supplies of a product which are stored in order to moderate extreme price fluctuations by assuring a more stable supply.
- Call price** The price level at which farmers with grain in the reserve must repay the nonrecourse loan plus any accumulated interest. The call price is above the release price and is established by the Secretary of Agriculture within the guidelines of the Food and Agriculture Act of 1977.
- Capital gains** The difference between the acquisition price and a higher current market value of a capital item such as real estate and equipment. Capital gains may be realized by actual sale or be an unrealized computation by assuming the capital items were sold at current market value.
- Cash flow** The total funds generated internally by a firm for covering costs and investment. Farming presents unique cash flow problems when income is generated only at the end of a production cycle, e.g., with annual crops and with livestock, or where crop failures occur, or if input prices rise faster than product prices.
- Coefficient of variation** Changes in a variable relative to the average value of the same variable. It permits a valid comparison of the variation in variables measured in different units or between variables with different numerical values, e.g., variation in the price of corn (in dollars per bushel) versus variation in corn production (in billions of bushels).
- Comparative (absolute) advantage** The condition when a country produces and exports those goods and services which it can produce *relatively* cheaply and imports those which other countries can produce *relatively* cheaply. Absolute advantage implies a coun-

- try produces goods and services more cheaply than any other country.
- Deficiency (compensatory) payments** Disbursements from USDA to any eligible producer equal to the difference for each unit of applicable products between the market price, or the nonrecourse price support loan, and a previously set target price.
- Disposable income** Earnings remaining after deductions of all direct taxes on those earnings/income, and available to be spent, invested, or saved as the receiver chooses.
- Exogenous variable** Any economic time series that influences, but is not influenced by, a set of economic relationships being studied; a variable that is determined outside the system of equations or relationships.
- Economies (diseconomies) of scale** The reduction in per unit cost of production associated with an increase in optimal size of operation usually resulting from specialization, division of labor, and technology. Diseconomies are the increase in per unit cost of production associated with nonoptimal growth in size resulting from inadequate management.
- Externality (economic)** An economic impact of any activity by an individual or business on others which is not reflected in the market for that activity. The impact can be positive or negative. Water pollution from farmland erosion can be a cost to the public users of the water resource but is not a part of the costs of the farm production.
- Forward contracting** An agreement between a buyer and seller for future delivery of a commodity specifying quantity, quality, place of delivery, price, and date. Exchange of title normally occurs at the time of delivery.
- Inelastic (elastic) demand as to price** A market demand in which a change in price will evoke a smaller proportional change in the quantity purchased, i.e., consumers tend to consume about the same amount regardless of the change in price, with the result that less expenditures in the aggregate are made for a "large" production than for a "small" one, and vice versa. An elastic demand exhibits the opposite characteristics.
- Inelastic (elastic) supply** Supply is inelastic if the increase in production is relatively less in response to a price change. If producers are responsive to a price change by increasing production proportionally more, supply is elastic.
- Nonrecourse price support loan** A price support loan set by the Secretary of Agriculture within the 1977 Act offered usually for a

marketing year to eligible farmers who put up specified storable commodities as collateral. If the product is sold during that period, the loan must be repaid plus interest; otherwise on the due date, the product is transferred to government stocks to satisfy the loan obligation. The government has "no recourse" to force repayment—only to take over the commodity held as collateral.

Paid diversion A set annual per acre payment offered to producers of specified products under agricultural price policy to induce their voluntary participation in a program to withhold resources from production, thereby balancing supply with demand at a higher price level. In effect, it is in lieu of a rental payment—or return—for the fixed resources being held idle.

Parameter An assigned constant value based on some type of statistical procedure, and can vary only when there is a structural or behavioral change in the entire system being studied.

Parity price That current price for a unit of farm commodity which would give it the same relative purchasing power for goods and services as it had in 1910-14, adjusted for the changes in its price over the past ten years compared to changes in the prices received by farmers for all farm products during the same period.

Pipeline stocks Quantity of any product needed to perform the normal processing and marketing operations.

Primary (derived) demand Final consumer or retail demand. Derived demand is primary demand minus processing and marketing charges, and thus can be shifted due to changes in either, e.g., the demand for corn, an important livestock input, is derived from the retail demand for meat and other livestock products.

Protectionism Usually a reaction by an industry or company to increasing foreign competition. The most common type of protectionism is expressed in policy as an import tariff or quota imposed to reduce imports and shield domestic producers.

Release price The price level at which farmers who have grain stored in the grain reserve may sell it without incurring penalties. It is established by the Secretary of Agriculture within the 1977 Act as a specified percentage above the nonrecourse loan level.

Returns to equity The net income or profit of a firm expressed as a percent of its resources which are owned debt-free, i.e., the excess of its assets over its liabilities.

Salvage value The market price that an owner could receive for any resource already used for some time in production, if it were offered for sale. Such a value is usually less than acquisition cost due to the preference of potential buyers for new, unused resources,

due to location disadvantages, or to deterioration in the quality of the resource for the intended production.

Target prices A value for a farm product set by the Secretary of Agriculture within the 1977 Act for a production/marketing year, usually at a level associated with—and changing with—production costs. If the market price for that product, usually for the first five months of its marketing year, averages less than this set value, eligible producers may apply for supplementary payments from the USDA equal to the lesser of the differences between the target value and either the average market price or the nonrecourse price support loan.

Trigger price A general term used to refer to the release and call prices.

Utility An economic concept which reflects the level of satisfaction an individual derives from the consumption of a particular good or service.

STATISTICAL APPENDIX

RELEVANT BACKGROUND DATA FOR FUTURE AGRICULTURAL-FOOD POLICY

The data contained in this Statistical Appendix are drawn from several different sources as indicated in the footnotes. The data are presented in three different ways: 1) in current dollars, 2) in constant 1972 dollars, and 3) as compound growth rates for selected sets of years. All 1979 data are either preliminary or estimates.

The information found in this Statistical Appendix was selected to form a common, consistent data base to be used as background for the analysis contained throughout the document. Of particular importance for agricultural and food policy analyses are data on agricultural productivity, output, prices, and income and on the level and variability of food prices. In addition, data on annual world grain production, utilization, and stocks are presented. Trends in agricultural trade are also presented.

Rapid changes have occurred in the structure of U.S. agriculture in the post-World War II period. These changes have raised numerous questions about the future structure of American agriculture. Selected data reflecting structural change are included.

Finally, domestic food assistance programs have expanded rapidly since the late 1960s. Selected data are presented on the aggregate expenditures on various federal food and nutrition programs and on food stamp participation rates.

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Table 1. Compound Growth Rates for Selected U.S. Agricultural and Food Data, 1960-1979

	1960- 1979	1960- 1971	1972- 1974	1975- 1979
Farm Output and Productivity				
Farm output				
Total output	1.8	1.7	-1.7	3.1
Crops	2.3	1.7	-1.3	4.4
Livestock	1.0	1.8	-0.5	1.4
Farm productivity				
Output/unit input	1.7	1.8	-1.8	1.9
Output/work hour	5.6	6.4	0.0	4.8
Nonfarm productivity				
Output/work hour	1.9	2.5	-0.7	1.1
Prices				
Prices received by farmers				
All farm products	5.0	1.6	23.9	6.7
Crops	4.4	0.8	40.2	2.7
Livestock and products	5.5	2.3	10.0	10.7
Prices paid by farmers	6.6	2.8	14.5	13.0
Producer prices (all commodities)	4.8	1.7	15.9	7.3
Consumer prices				
All items	4.8	2.9	8.6	7.8
Food	5.3	2.7	14.4	7.5
Implicit GNP Price Deflator	4.7	3.1	7.7	6.8

Table 1. Compound Growth Rates for Selected U.S. Agricultural and Food Data, 1960-1979 (continued)

	1960- 1979	1960- 1971	1972- 1974	1975- 1979
Farm Commodity Price				
Wheat				
Current dollars	3.8	-2.4	52.5	-0.3
Constant dollars	-0.9	-5.2	41.6	-6.7
Soybeans				
Current dollars	6.4	3.3	23.3	8.7
Constant dollars	1.6	0.2	14.4	1.8
Corn				
Current dollars	4.6	0.7	38.7	-1.8
Constant dollars	-0.1	-2.4	28.7	-8.1
Hogs				
Current dollars	5.4	1.2	16.7	-2.7
Constant dollars	0.6	-1.9	8.4	-8.9
Cattle				
Current dollars	6.4	3.2	3.1	19.6
Constant dollars	1.6	0.2	-4.3	12.0
Per Capita Disposable Income				
Farm population (all sources)				
Current dollars	10.5	8.7	15.9	12.1
Constant dollars	5.5	5.4	7.6	4.9
Farm sources				
Current dollars	9.4	6.5	19.9	12.2

.....percent.....

Table 1. Compound Growth Rates for Selected U.S. Agricultural and Food Data, 1960-1979 (continued)

	1960- 1979	1960- 1971	1972- 1974	1975- 1979
	..... percentages.			
Farm sources				
Current dollars	4.6 ^a	1.7	17.7	4.8 ^a
Constant dollars	0.1 ^a	-1.3	9.2	-1.3 ^a
Nonfarm sources				
Current dollars	8.0 ^a	7.1	10.8	8.3 ^a
Constant dollars	3.2 ^a	3.9	2.9	2.0 ^a
Value of Farm Physical Assets				
Current dollars	22.7	25.7	-3.8	18.5
Constant dollars	16.1	21.6	-10.7	6.2
Farm Structure				
Average size	1.7 ^b	2.2	0.8	0.8 ^b
Total number of farms	-2.2	-2.8	-1.1	-1.2
Number of farms by sale classes ^c				
Less than \$20,000	-4.1	-3.9	-5.8	-4.9
\$20,000 to \$100,000	5.0	4.4	10.7	5.2
More than \$100,000	10.3	9.6	35.2	1.4

U.S. Agricultural Trade					
Exports					
Current dollars	10.9	4.3	53.0	12.3	
Constant dollars	5.9	1.2	42.0	5.1	
Imports					
Current dollars	8.1	3.9	25.9	15.8	
Constant dollars	3.2	0.8	16.9	8.4	
Net agricultural trade balance					
Current dollars	16.4	5.8	100.1	9.4	
Constant dollars	11.1	2.6	85.8	2.4	
Food Program Outlay					
Total costs					
Current dollars	n.a.	n.a.	24.1	11.0	
Constant dollars	n.a.	n.a.	15.2	3.9	
Food stamps					
Current dollars	58.4	96.6	32.9	8.1	
Constant dollars	54.3	97.4	23.4	1.2	

^aRefers to growth rate for total period less one year due to lack of data for 1979.

^bRate refers to growth occurring only to 1978, since 1979 data are not comparable due to a definition change.

^cSince the sales upon which these classifications are based were not adjusted for inflation, the changes tend to be exaggerated.

Table 2. U.S. Farm Aggregate Output and Productivity, 1960-1979. (1972 = 100)

Year	Total Livestock and Products	Crops			Total Output	Productivity	
		Total Crops	Feed Grains	Food Grains		Total Output Per Unit Total Input	Total Output Per Hour of Farm Work
1960	81	82	78	85	83	82	48
1961	85	81	70	78	83	83	49
1962	86	82	71	73	84	84	52
1963	89	85	77	75	87	87	57
1964	91	82	70	84	86	86	60
1965	89	88	79	86	89	91	65
1966	91	84	79	86	86	88	68
1967	93	88	89	98	91	91	74
1968	93	91	85	104	93	93	78
1969	94	92	88	96	93	94	81
1970	98	88	79	89	92	93	85
1971	99	99	104	105	100	100	94
1972	100	100	100	100	100	100	100
1973	98	105	103	112	102	101	96
1974	99	97	83	118	96	96	100
1975	94	107	102	139	104	105	112
1976	98	107	107	138	106	105	119
1977	99	115	113	129	110	106	127
1978	99	116	121	121	110	106	135
1979	100	127	129	140	117	113	135

Source: U.S. G.P.O. *Economic Report of the President*. 1980, pp. 246, 310.

Table 3. Indexes of Prices Received and Paid by Farmers, 1960-1979. (1972 = 100)

Year	Prices Received			Prices Paid All Commodities, Interest, Tax, Wages
	All Farm Products	Crops	Livestock and Products	
1960	76	87	68	70
1961	78	89	67	70
1962	78	90	68	72
1963	78	94	65	73
1964	76	93	63	74
1965	78	90	69	75
1966	85	93	78	79
1967	80	88	74	80
1968	82	88	76	83
1969	86	85	86	86
1970	88	88	87	90
1971	90	95	87	95
1972	100	100	100	100
1973	143	154	135	115
1974	153	196	121	131
1975	148	176	126	144
1976	149	173	130	154
1977	147	168	129	162
1978	168	180	160	175
1979	193	196	189	235

Sources: USDA. *Agricultural Statistics*. 1979, p. 452, and U.S. G.P.O. *Economic Report of the President*. 1980, p. 312.

Table 4. Selected U.S. Price Indexes, 1960-1979. (1972 = 100)

Year	Producer Price Index All Commodities	Consumer Price Index		Implicit GNP Price Deflator
		All Items	Food Only	
1960	79.7	70.8	71.3	68.7
1961	79.3	71.5	72.1	69.3
1962	79.6	72.3	72.8	70.6
1963	79.3	73.2	73.8	71.6
1964	79.5	74.1	74.8	72.7
1965	81.1	75.4	76.4	74.3
1966	83.8	77.6	80.2	76.8
1967	84.0	79.8	81.0	79.0
1968	86.1	83.2	83.9	82.6
1969	89.4	87.6	88.2	86.7
1970	92.7	92.8	93.0	91.4
1971	95.7	96.8	95.9	96.0
1972	100.0	100.0	100.0	100.0
1973	113.1	106.2	114.5	105.8
1974	134.4	117.8	130.9	116.0
1975	146.9	128.7	142.0	127.2
1976	153.7	136.1	146.4	133.7
1977	163.1	144.9	155.6	141.7
1978	175.7	155.9	171.2	152.1
1979	194.5	173.5	189.9	165.5

Sources: U.S. Department of Commerce, *Statistical Abstract of the United States*, 1979, p. 447; U.S. G.P.O. *Economic Report of the President*, 1980, p. 208; and USDA-ESCS, *Agricultural Outlook*, various issues.

Table 5. Selected U.S. Average Farm Commodity Prices Received by Farmers, 1960-1979

Year	Wheat		Soybeans		Corn	
	Current Dollars	Constant Dollars	Current Dollars	Constant Dollars	Current Dollars	Constant Dollars
1960	1.74	2.53	2.13	3.10	1.00	1.46
1961	1.83	2.64	2.28	3.29	1.10	1.59
1962	2.04	2.89	2.34	3.32	1.12	1.59
1963	1.85	2.58	2.51	3.51	1.11	1.55
1964	1.37	1.88	2.62	3.60	1.17	1.61
1965	1.35	1.82	2.54	3.42	1.16	1.56
1966	1.63	2.12	2.75	3.58	1.24	1.62
1967	1.39	1.76	2.49	3.15	1.03	1.30
1968	1.24	1.50	2.43	2.94	1.08	1.31
1969	1.25	1.44	2.35	2.71	1.16	1.34
1970	1.33	1.46	2.85	3.12	1.33	1.46
1971	1.34	1.40	3.03	3.16	1.08	1.12
1972	1.76	1.76	4.37	4.37	1.57	1.57
1973	3.95	3.73	5.68	5.37	2.55	2.41
1974	4.09	3.53	6.64	5.72	3.02	2.60
1975	3.56	2.80	4.92	3.87	2.54	2.00
1976	2.73	2.04	6.81	5.09	2.15	1.61
1977	2.29	1.62	6.82	4.81	2.03	1.43
1978	2.82	1.85	6.28	4.13	2.10	1.38
1979	3.51	2.12	6.86	4.15	2.36	1.43

Sources: USDA, *Agricultural Statistics*, various issues, and USDA-ESCS, *Agricultural Outlook*, various issues.

Table 5. Selected U.S. Average Farm Commodity Prices Received by Farmers, 1960-1979
(continued)

Year	Hogs		Cattle	
	Current Dollars	Constant Dollars	Current Dollars	Constant Dollars
1960	15.30	22.28	dollars/cwt.	29.71
1961	16.60	23.96	20.40	29.16
1962	16.30	23.10	20.20	30.19
1963	14.90	20.81	21.30	27.80
1964	14.80	20.35	19.90	24.76
1965	19.60	26.37	18.00	
1966	23.50	30.61	19.90	26.78
1967	19.10	24.17	22.20	28.92
1968	18.50	22.41	22.30	28.22
1969	22.20	25.60	23.40	28.34
			26.20	30.21
1970	22.70	24.85		
1971	17.50	18.23	27.10	29.66
1972	25.10	25.10	29.00	30.20
1973	38.40	36.29	33.50	33.50
1974	34.20	29.48	42.80	40.45
			35.60	30.68
1975	46.10	36.26		
1976	43.30	32.38	32.30	25.40
1977	40.10	27.30	33.70	25.20
1978	47.10	30.98	34.50	24.35
1979	41.40	25.02	48.50	31.90
			66.10	39.94

Sources: USDA. *Agricultural Statistics*. various issues, and USDA-ESCS. *Agricultural Outlook*. various issues.

Table 6. Means of Prices Received by Farmers for Selected Commodities, 1960-1977

Commodity	1960-1964	1965-1969	1970-1974	1975-1977
	..... current dollars			
Corn (\$/bu.)	1.10	1.13	1.91	2.35
Wheat (\$/bu.)	1.77	1.37	2.49	3.00
Oats (\$/bu.)	0.62	0.63	0.93	1.39
Barley (\$/bu.)	0.92	0.97	1.62	2.16
Soybeans (\$/bu.)	2.38	2.51	4.51	5.77
Soybean Meal (\$/ton)	67.73	77.94	134.98	170.59
Choice Steers (\$/cwt.)	24.17	26.48	36.79	41.37
Barrows & Gilts (\$/cwt.)	16.13	21.41	28.49	44.17
Lambs (\$/cwt.)	17.91	23.98	30.70	46.77
Broilers (¢/lb.)	26.9	19.7	15.0	14.5
Turkeys (¢/lb.)	21.8	21.5	26.6	34.0
Eggs (¢/doz.)	34.8	35.6	41.4	55.5
All Milk Wholesale (\$/cwt.)	4.15	4.96	6.62	9.38
Index of Prices Received by Farmers for Farmers for All Commodities (1967 = 100)	96.2	102.6	152.3	184.7

 Source: Means computed from data published in USDA. *Agricultural Statistics*. 1978.

Table 7. Annual Variability of Prices Received by Farmers for Selected Commodities, 1960-1977a

Commodity	1960-1964	1965-1969	1970-1974	1975-1977
Corn	5.6	7.1	43.7	11.9
Wheat	14.0	11.7	56.3	21.6
Oats	2.4	5.7	44.0	15.8
Barley	5.8	7.9	50.5	14.9
Soybeans	8.1	6.0	36.5	16.7
Soybean Meal	7.8	3.5	44.1	15.6
Steers, Choice	6.9	6.8	17.3	6.9
Hogs	5.2	10.1	31.9	8.5
Lamb	8.1	8.3	16.5	9.8
Broilers	8.5	17.1	7.9	7.4
Turkeys	10.8	6.9	26.0	5.9
Eggs	3.0	10.5	26.4	5.3
All Milk Wholesale	1.5	9.7	16.7	5.8
Index of Prices Received by Farmers for All Products	1.4	3.7	25.7	0.8

aVariability expressed in terms of coefficient of variation.

Source: Coefficients computed from data published in USDA. *Agricultural Statistics*. 1978.

Table 8. Per Capita Disposable Personal Incomes: Farm and Nonfarm Populations, 1960-1979

Year	Income of Farm Populations			Income of Nonfarm Population		Farm as a Percent of Nonfarm
	All Income Sources	Percent from Nonfarm Sources ^a		(current dollars)	(constant dollars)	
	(current dollars)	(constant dollars)	(percent)	(current dollars)	(constant dollars)	(percent)
1960	1,083	1,577	39	2,014	2,932	54
1961	1,182	1,706	40	2,045	2,951	58
1962	1,261	1,787	42	2,124	3,010	59
1963	1,364	1,905	45	2,186	3,053	62
1964	1,394	1,917	49	2,341	3,219	59
1965	1,692	2,276	47	2,480	3,336	68
1966	1,894	2,467	47	2,641	3,440	72
1967	1,925	2,436	51	2,788	3,528	69
1968	2,099	2,542	53	2,976	3,604	70
1969	2,332	2,689	52	3,152	3,634	74
1970	2,520	2,758	53	3,389	3,709	74
1971	2,722	2,834	53	3,629	3,779	75
1972	3,244	3,244	51	3,865	3,865	84
1973	4,700	4,442	40	4,266	4,032	110
1974	4,355	3,753	48	4,660	4,016	93
1975	4,520	3,554	51	5,113	4,021	88
1976	4,314	3,226	58	5,553	4,153	77
1977	4,946	3,490	58	6,053	4,271	81
1978	6,069	3,991	53	6,696	4,403	91
1979	7,128	4,306	51	7,391	4,465	97

^a Assumes the proportion between farm and nonfarm income sources is the same for the personal income and the disposable personal income of the farm population.

Source: USDA-ESCS, *Farm Income Statistics*, Stat. Bull. 627, Oct. 1979, p. 36.

Table 9. U.S. Gross and Net Farm Income, 1960-1979

Year	Gross Farm Income		Net Farm Income ^a	
	Current Dollars	Constant Dollars	Current Dollars	Constant Dollars
1960	38,497	56,061	11,518	16,773
1961	40,211	58,041	11,957	17,259
1962	41,723	59,140	12,064	17,100
1963	42,739	59,700	11,770	16,441
1964	43,121	59,305	10,492	14,430
1965	45,507	61,231	12,899	17,356
1966	50,551	65,856	13,960	18,187
1967	49,863	63,102	12,339	15,615
1968	51,723	62,641	12,322	14,923
1969	56,309	64,932	14,293	16,482
1970	58,569	64,108	14,151	15,489
1971	60,603	63,115	14,633	15,240
1972	70,119	70,119	18,665	18,665
1973	95,505	90,269	33,349	31,521
1974	99,951	86,150	26,130	22,522
1975	96,938	76,239	24,475	19,249
1976	104,177	77,913	18,682	13,972
1977	107,478	76,849	19,759	13,944
1978	124,914	82,153	27,880	18,336
1979	146,700	88,640	33,300	20,121

^aAfter inventory adjustments.Source: USDA-ESCS. *State Farm Income Statistics*. Supplement to Stat. Bull. 627, Jan. 1980, p. 42.

Table 10. U.S. Farm Cash Receipts and Government Payments, 1960-1979

Year	Cash Receipts From Farm Marketings		Government Payments	
	Current Dollars	Constant Dollars	Current Dollars	Constant Dollars
	.....	..... million dollars .....	.....	.....
1960	34,248	49,873	702	1,022
1961	35,164	50,756	1,493	2,155
1962	36,468	51,691	1,747	2,476
1963	37,477	52,349	1,696	2,369
1964	37,326	51,335	2,181	3,000
1965	39,365	52,967	2,463	3,314
1966	43,435	56,585	3,277	4,269
1967	42,817	54,185	3,079	3,896
1968	44,183	53,510	3,462	4,193
1969	48,179	55,557	3,794	4,375
1970	50,539	55,319	3,717	4,069
1971	52,859	55,050	3,145	3,275
1972	61,190	61,190	3,961	3,961
1973	87,068	82,295	2,607	2,464
1974	92,449	79,684	531	458
1975	88,209	69,374	807	635
1976	94,780	70,885	734	549
1977	95,654	67,505	1,819	1,284
1978	111,042	73,030	3,030	1,993
1979	128,900	77,885	1,375	831

Source: USDA-ESCS. *State Farm Income Statistics*. Supplement to Stat. Bull. 627, Jan. 1980, p. 42.

Table 11. Personal U.S. Farm Income, 1960-1978

Year	Farm Sources ^a		Nonfarm Sources ^b		All Sources	
	Current Dollars	Constant Dollars	Current Dollars	Constant Dollars	Current Dollars	Constant Dollars
	..... million dollars.....					
1960	11,126	16,202	7,236	10,537	18,362	26,739
1961	11,410	16,469	7,637	11,023	19,047	27,493
1962	11,395	16,152	8,342	11,824	19,737	27,976
1963	11,012	15,382	8,958	12,513	19,970	27,895
1964	10,012	13,770	9,743	13,400	19,755	27,170
1965	11,968	16,103	10,627	14,300	22,595	30,402
1966	12,608	16,425	11,205	14,597	23,813	31,023
1967	11,117	14,069	11,737	14,853	22,854	28,922
1968	11,271	13,650	12,828	15,536	24,099	29,186
1969	12,927	14,907	13,929	16,062	26,856	30,969
1970	13,005	14,235	14,473	15,842	27,478	30,077
1971	13,484	14,043	15,346	15,982	28,830	30,025
1972	16,856	16,856	17,751	17,751	34,607	34,607
1973	29,230	27,628	19,690	18,611	48,920	46,238
1974	23,353	20,128	21,798	18,788	45,151	38,917
1975	21,888	17,214	22,660	17,821	44,548	35,036
1976	16,765	12,603	23,500	17,575	40,265	30,114
1977	18,015	12,713	24,920	17,586	42,935	30,300
1978	25,163	16,549	28,787	18,933	53,950	35,482

^aIncludes returns from farming to resident farm operators for their capital, labor, and management, after deduction of farm production expenses.

^bIncludes all income received by farm residents from nonfarm sources such as: wages and salaries from non-farm employment, nonfarm business and professional income, rents from nonfarm real estate, dividends, interest, royalties, unemployment compensation, and Social Security payments.

Source: USDA, *Agricultural Statistics*, 1979, p. 463.

Table 12. Value of Physical Farm Assets, 1960-1979

Year	Physical Farm Assets	
	Current Dollars	Constant Dollars
	..... million dollars	
1960	2,347	3,418
1961	8,262	11,926
1962	8,036	11,391
1963	7,896	11,029
1964	9,637	13,254
1965	16,382	22,043
1966	14,333	18,672
1967	12,353	15,633
1968	13,987	16,940
1969	12,376	14,271
1970	11,199	12,258
1971	23,131	24,090
1972	40,426	40,426
1973	79,475	75,118
1974	37,391	32,228
1975	58,367	45,904
1976	75,916	56,777
1977	50,045	35,318
1978	101,573	66,802
1979	115,100	69,547

Source: USDA-ESCS. 1979 Balance Sheet of the Farming Sector. Supplement, Agr. Info. Bull. 430, Feb. 1980, p. 42.

Table 13. U.S. Farm Structural Characteristics, 1960-1979

Year	Average Size of Farms	Number of Farms	Number of Farms by Total Sales Classes ^a		
			Less than \$20,000	\$20,000 to \$100,000	\$100,000 or more
	(acres)	..... thousands			
1960	297	3,963	3,623	317	23
1961	305	3,825	3,463	336	26
1962	314	3,692	3,303	360	29
1963	322	3,572	3,161	380	31
1964	332	3,457	3,043	382	32
1965	340	3,356	2,915	405	36
1966	348	3,257	2,767	447	43
1967	355	3,162	2,678	441	43
1968	363	3,071	2,571	455	45
1969	369	3,000	2,449	500	51
1970	374	2,949	2,388	504	57
1971	378	2,902	2,330	509	63
1972	382	2,860	2,240	538	82
1973	385	2,823	2,046	640	137
1974	388	2,795	1,986	659	150
1975	391	2,767	1,985	640	142
1976	394	2,738	1,922	661	155
1977	397	2,706	1,889	660	157
1978	400	2,672	1,772	713	187
1979	450 ^b	2,639	1,623	786	150

^aSince the sales upon which these classifications are based were not adjusted for inflation, the changes tend to be exaggerated.

^bA substantial part of this jump in farm size is due to a change in the Census definition of a farm.

Sources: USDA-ESCS *Agricultural Statistics*. 1978, p. 417 and 1976, p. 417; USDA-ESCS *Farm Income Statistics*. Stat. Bull. 627, Oct. 1979, p. 52; and unpublished sources for 1979.

Table 14. U.S. Agricultural Trade Account, 1960-1979

Year	U.S. Agricultural Exports		U.S. Agricultural Imports		U.S. Agricultural Trade Balance	
	Current Dollars	Constant Dollars	Current Dollars	Constant Dollars	Current Dollars	Constant Dollars
	.....	.....	.....	million dollars	.....	.....
1960	4,832	7,037	3,824	5,569	1,008	1,468
1961	5,024	7,252	3,691	5,328	1,333	1,924
1962	5,034	7,135	3,868	5,483	1,166	1,652
1963	5,584	7,800	4,011	5,603	1,573	2,197
1964	6,348	8,731	4,082	5,614	2,266	3,116
1965	6,229	8,381	4,087	5,499	2,142	2,882
1966	6,881	8,964	4,491	5,851	2,390	3,114
1967	6,380	8,074	4,452	5,634	1,928	2,440
1968	6,228	7,543	5,024	6,085	1,204	1,458
1969	5,936	6,845	4,957	5,716	979	1,129
1970	7,259	7,945	5,770	6,316	1,489	1,630
1971	7,693	8,012	5,823	6,064	1,870	1,948
1972	9,401	9,401	6,467	6,467	2,934	2,934
1973	17,680	16,711	8,419	7,957	9,261	8,753
1974	21,999	18,961	10,247	8,832	11,752	10,129
1975	21,884	17,211	9,310	7,322	12,574	9,889
1976	22,997	17,199	10,992	8,221	12,005	8,978
1977	23,657	16,695	13,459	9,498	10,198	7,197
1978	29,406	19,340	14,799	9,733	14,607	7,607
1979	34,745	20,994	16,722	10,104	18,023	10,890

Sources: USDA-ESCS. *U.S. Foreign Agricultural Trade Statistical Report, Calendar Year 1977*. A Supplement to the Monthly Foreign Agricultural Trade of the United States, June 1978, p. 1, and USDA-ESCS. *Foreign Agricultural Trade of the United States, Jan./Feb., 1980*.

Table 15. Selected U.S. Agricultural Trade Data, 1960-1979

	U.S. Ag. Exports as % of Total Exports	U.S. Ag. Imports as % of Total Imports	Net Ag. Trade Balance as % Gross Farm Income	Annual Change in U.S. Ag. Trade Balance		Percent Annual Change in U.S. Ag. Trade Balance
				Current \$ (million)	Constant \$ (million)	
1960	24	25	2.6	+1,152	+1,681	—
1961	24	25	3.3	+ 325	+ 456	+31
1962	23	24	2.8	- 167	- 272	-14
1963	24	24	3.7	+ 407	+ 545	+33
1964	24	22	5.3	+ 693	+ 919	+42
1965	23	19	4.7	- 124	- 234	- 8
1966	23	18	4.7	+ 248	+ 232	+ 8
1967	20	17	3.9	- 462	- 674	-22
1968	18	15	2.3	- 724	- 982	-40
1969	16	14	1.7	- 225	- 329	-23
1970	17	15	2.5	+ 510	+ 501	+44
1971	18	13	3.1	+ 381	+ 318	+20
1972	19	12	4.2	+1,064	+ 986	+16
1973	23	12	9.7	+6,327	+5,819	+198
1974	23	10	11.8	+2,491	+1,376	+16
1975	21	10	13.0	+ 822	- 240	- 2
1976	20	8	11.5	- 569	- 911	- 9
1977	20	9	9.4	-1,807	-1,781	-20
1978	21	9	11.7	+4,409	+2,410	+33
1979	19	8	12.2	+3,416	+1,283	+13

Sources: USDA-ESCS. *U.S. Foreign Agricultural Trade Statistical Report, Calendar Year 1977*. A Supplement to the Monthly Foreign Agricultural Trade of the United States, Jan. 1980 p. 5, and USDA-ESCS. *State Farm Income Statistics*. Supplement to Stat. Bull. No. 627, Jan. 1980, p. 42.

Table 16. Federal Cost of USDA Food Programs (50 States and District of Columbia).
(thousand dollars)^a

Year	Food Stamps Total Issued	Bonus ^b Stamps	Food Distribution ^c				Child Nutrition ^f				WIC ^h	Total ⁱ
			Needy Families	Schools ^d	Other ^e	School Lunch	School Breakfast	Special Food ^g	Special Milk			
1960		0.0	59									
1961		0.4	(.6)	140								
1962		13	(18)	227								
1963		19	(27)	204								
1964		29	(40)	197								
1965		33	(44)	227								
1966		65	(85)	134								
1967		106	(134)	101								
1968		173	(210)	124								
1969	603	229	(264)	224	272	26	204	5	2	101		1,063 (1,226)
1970	1,925	1,104	(1,208)	294	272	35	366	14	16	96		2,197 (2,405)
1971	3,103	1,699	(1,769)	318	297	40	645	22	34	92		3,146 (3,276)
1972	3,615	1,980	(1,980)	271	283	40	764	28	44	91		3,501 (3,501)
1973	4,049	2,209	(2,088)	223	257	43	959	44	52	64		3,852 (3,641)
1974	5,868	3,498	(3,015)	87	355	36	1,137	67	87	90	33	5,390 (4,646)
1975	7,680	4,602	(3,619)	11	364	33	1,340	94	116	134	106	6,800 (5,348)
1976	7,818	4,657	(3,482)	8	448	33	1,505	118	240	147	182	7,337 (5,485)
1977	7,435	4,379	(3,092)	12	529	51	1,647	147	237	151	281	7,433 (5,249)
1978	7,482	4,588	(3,017)	11	629	93	1,849	181	258	138	405	8,151 (5,359)
1979	—	6,286	(3,798)	6	792	123	2,086	230	318	147	564	10,318 (6,235)

^aData in parentheses are in constant 1972 dollars; all other data are in current dollars.

^bIncludes food certificate program, 1975-1976.

^cCost of food delivered to state distribution centers.

^dIncludes special food services.

^eIncludes supplemental food, institutions, elderly persons.

^fMoney donated for local purchase of food. Excludes nonfood assistance.

^gIncludes child-care and summer food programs.

^hSpecial Supplemental Food Program for Women, Infants, and Children begun January 1974.

ⁱExcludes those food stamps paid for by the recipient. Does not add due to rounding.

Sources: USDA: NES-151, p. 35; NFS-156, p. 20; NFR-4, p. 13; NFR-6, p. 9; NFR-8, p. 5; Paul E. Nelson, Jr., and John Perrin. *Economic Effects of the U.S. Food Stamp Program*. USDA-ERS Agr. Econ. Rep. 331, July, 1976, p. 2.

Table 17. Food Stamp Participation, 1962-1979

Year	Participation		Proportion of Population (percent)	Unemployment Rate in U.S. (percent)
	Persons (thousands)	Project Areas ^a		
1962 ^b	141	8	3.53	5.5
1963	358	42	3.13	5.7
1964	360	43	2.91	5.2
1965	633	110	2.78	4.5
1966	1,218	324	2.61	3.8
1967	1,832	838	2.45	3.8
1968	2,420	1,027	2.83	3.6
1969	3,222	1,489	3.36	3.5
1970	6,457	1,747	5.12	4.9
1971	10,549	2,027	6.88	5.9
1972	11,594	2,126	7.01	5.6
1973	12,107	2,228	6.93	4.9
1974	13,524	2,818	7.05	5.6
1975 ^c	19,238	3,046	9.05	8.3
1976	17,982	3,035	8.35	8.4
1977	16,097	3,035	7.42	7.6
1978	15,120	3,038	6.93	6.6
1979	18,936	2,950	8.58	5.7

^aProject areas in the food stamp program are primarily the number of counties covered, but cities and Indian agencies are also included.

^bThe Food stamp program began operations in June 1961.

^cThe participation increase in fiscal year 1975 is partly attributable to two factors: the transition from the food distribution to the food stamp program in Puerto Rico and the rise in U.S. unemployment. If Puerto Rico's 1,524,000 participation is excluded, the percent of population is reduced to 8.33 percent. Sources: U.S. Senate, 95th Congress, 1st Session and USDA-FNS.

Table 18. Year-to-year Percentage Changes in Farm and Retail Prices, 1960-1978

	Index of Prices Received by Farmers	CPI for Food	Market Basket of Foods	
			Farm Value	Retail Value
	.....	.....	percent .....	.....
1960	-1.0	1.0	2.1	0.5
1961	1.1	1.3	-1.8	0.3
1962	2.1	0.9	2.3	1.0
1963	-1.0	1.4	-4.3	-0.2
1964	-2.1	1.3	-0.3	0.2
1965	3.2	2.2	10.3	2.8
1966	8.2	5.0	7.0	5.3
1967	-5.7	0.9	-5.8	-1.0
1968	2.0	3.6	5.3	3.6
1969	4.9	5.1	9.1	5.3
1970	2.8	5.5	-0.6	4.2
1971	2.7	3.0	0.4	1.8
1972	10.6	4.3	9.2	4.9
1973	43.2	14.5	33.8	17.2
1974	7.3	14.4	6.6	13.9
1975	-3.6	8.5	5.0	7.2
1976	0.5	3.1	-4.6	1.0
1977	-1.6	6.3	0.1	2.2
1978	14.2	10.0	16.0	11.3

Source: USDA. *Agricultural Statistics*, 1978.

Table 19. Means of Retail Price and Farm Value of Selected Foods, 1960-1977

	Retail Price (current dollars)				Derived Farm Value (current dollars)			
	1960-64	1965-69	1970-74	1975-77	1960-64	1965-69	1970-74	1975-77
Beef, Choice (¢/lb.)	79.1	85.6	118.2	141.1	50.1	55.2	75.6	83.6
Pork (¢/lb.)	57.1	69.7	89.9	131.6	28.7	38.4	50.4	79.6
Lamb (¢/lb.)	72.1	89.1	122.9	180.1	37.7	51.6	66.4	100.4
Broilers (¢/lb.)	38.9	40.0	47.7	61.0	21.1	20.5	24.9	34.2
Turkey (¢/lb.)	—	48.5	62.4	73.2	—	27.4	33.6	42.7
Eggs (¢/doz.)	55.1	55.1	64.5	81.4	34.3	34.8	41.2	54.2
Shortening (¢/3 lb.)	83.3	86.1	114.4	168.7	26.7	27.7	48.8	67.3
Margarine (¢/lb.)	26.5	28.0	38.1	57.5	7.6	7.9	13.8	19.4
Salad Oil (¢/24 oz.)	—	51.6	72.5	106.0	—	12.8	22.1	33.7
Fresh Milk (¢/½ gal.)	47.5	51.4	64.0	81.7	21.9	25.1	32.7	44.4
Rice (¢/lb.)	21.2	21.9	30.7	43.4	7.3	7.3	11.8	12.2
Flour (¢/½ lb.)	55.3	58.5	71.4	92.1	19.2	21.3	28.5	29.1
Cereal (¢/12 oz.)	27.1	30.5	34.1	53.0	2.0	2.1	2.9	4.1
Evaporated Milk (¢/1 ½ oz.)	15.2	16.6	21.9	33.8	6.3	7.7	10.7	16.2
Ice Cream (¢/½ gal.)	82.9	80.1	90.8	128.2	21.9	25.3	32.0	44.7
Cheese (¢/½ lb.)	35.6	42.9	58.2	82.6	14.9	18.5	26.7	39.7

Source: Means computed from data published in Forrest E. Scott and Henry T. Badger, *Farm-Retail Spreads for Food Products*. USDA-ERS. Misc. Pub. 741. Jan. 1972 and from unpublished data provided by the authors for 1971-77.

Table 20. Annual Variability of Retail Price, Farm Value, and Marketing Margin for Selected Foods, 1960-1977a

Food Items	Retail Price				Farm Value				Marketing Margin			
	1960-64	1965-69	1970-74	1975-77	1960-64	1965-69	1970-74	1975-77	1960-64	1965-69	1970-74	1975-77
Beef	2.5	22.9	14.4	3.0	7.0	21.1	13.9	9.7	5.5	28.1	19.7	7.0
Pork	2.4	29.2	24.3	4.1	5.6	36.4	32.0	8.6	3.0	22.4	17.3	7.4
Lamb	3.1	30.7	22.7	6.0	7.4	30.0	24.5	6.5	4.3	32.2	20.9	6.2
Broilers	4.3	20.8	18.8	3.1	7.7	28.2	27.2	7.1	1.3	13.7	9.8	1.9
Turkey	—	19.3	13.8	0.5	—	22.4	19.5	4.5	—	18.8	10.9	7.4
Eggs	3.0	20.5	18.7	4.9	6.1	26.0	24.8	6.7	2.8	12.4	9.1	4.3
Shortening	5.0	34.3	30.4	11.6	11.5	51.9	43.2	13.6	5.4	27.0	26.7	13.4
Margarine	2.6	34.9	29.6	9.1	12.2	52.1	43.3	12.6	3.5	29.5	26.5	8.4
Salad Oil	—	34.4	27.8	9.6	—	54.3	45.3	18.8	—	28.1	22.6	10.0
Fresh Milk	0.2	20.8	16.1	3.5	1.2	25.7	19.6	6.3	1.1	15.9	12.5	2.0
Rice	2.5	36.7	32.3	8.2	3.9	40.5	36.9	19.5	2.8	39.6	36.6	7.7
Flour	1.6	24.6	23.2	7.9	4.3	29.7	30.4	25.4	1.5	25.8	24.8	0.6
Cereal	4.6	25.9	25.1	4.3	4.2	37.6	33.4	12.9	4.8	25.7	25.3	5.7
Evaporated Milk	1.8	32.5	26.6	8.2	2.1	34.2	37.1	6.8	2.8	31.2	26.6	9.7
Ice Cream	2.2	21.4	20.0	5.2	2.3	25.7	20.9	4.4	2.8	19.6	19.9	6.0
Cheese	2.8	29.0	21.7	6.2	1.7	34.1	25.1	4.7	4.7	25.0	19.2	5.7

aVariability expressed in terms of coefficient of variation.

Source: Coefficients computed from data published in Forrest E. Scott and Henry T. Badger, *Farm-Retail Spreads for Food Products*, USDA-ERS Misc. Pub. 741, Jan. 1972 and from unpublished data provided by the authors for 1971-77.

Table 21. World Wheat Supply and Utilization, 1960-1961 to 1979-1980.^a

	Area Harvested	Yield	Production	July/June Trade	Total Utilization	Ending Stocks	Stocks as % of Utilization
	(mil. ha.)	(tons/ha)	..... million metric tons.....				
1960-1961	203	1.18	239.4	42	236.3	79.2	33.5
1961-1962	202	1.12	226.4	47	238.3	67.4	28.3
1962-1963	207	1.23	255.3	44	250.9	71.8	28.6
1963-1964	207	1.15	237.4	56	244.0	65.2	26.7
1964-1965	216	1.27	274.5	52	266.4	73.3	27.5
1965-1966	216	1.22	264.1	61	282.3	55.2	19.6
1966-1967	215	1.44	309.0	56	282.2	82.0	29.1
1967-1968	219	1.35	297.0	51	288.6	90.4	31.3
1968-1969	224	1.46	328.2	45	304.2	114.4	37.6
1969-1970	218	1.42	309.7	50	326.7	97.4	29.8
1970-1971	207	1.52	315.5	55	338.9	74.0	21.8
1971-1972	213	1.64	348.8	52	341.6	81.1	23.7
1972-1973	211	1.63	343.2	67	361.6	63.1	17.5
1973-1974	217	1.72	372.4	63	364.0	70.3	19.3
1974-1975	220	1.62	357.2	64	362.4	63.7	17.6
1975-1976	225	1.56	350.4	67	351.9	62.2	17.7
1976-1977	232	1.79	415.1	63	378.0	99.3	26.3
1977-1978	226	1.70	382.6	73	400.3	81.6	20.4
1978-1979	226	1.94	438.9	71	415.5	105.0	25.3
1979-1980 ^b	226	1.78	402.9	80	422.3	85.7	20.3

^aFor notes and definitions, see the original table as cited in source.^bProjection.Source: USDA-FAS. *Foreign Agriculture Circular*. FG-24-79, Dec. 13, 1979, p. 24.

Table 22. World Coarse Grain Supply and Utilization, 1960-1961 to 1979-1980.^a

	Area Harvested	Yield (tons/ha)	Production	July/June Trade	Total Utilization	Ending Stocks	Stocks as % of Utilization
	(mil. ha.)		..... million metric tons.....				
1960-1961	328	1.37	451.2	24	440.5	109.4	24.8
1961-1962	321	1.35	433.9	30	448.7	94.5	21.1
1962-1963	320	1.43	459.5	31	461.5	92.4	20.0
1963-1964	326	1.44	467.9	34	462.5	97.6	21.1
1964-1965	323	1.46	473.0	35	479.6	90.7	18.9
1965-1966	319	1.52	485.2	42	501.2	74.8	14.9
1966-1967	321	1.62	521.4	40	520.0	75.8	14.6
1967-1968	326	1.69	551.0	39	542.1	84.7	15.6
1968-1969	326	1.69	551.6	37	547.6	88.7	16.2
1969-1970	329	1.75	576.1	39	574.9	89.4	15.6
1970-1971	330	1.74	575.7	46	594.7	72.8	12.2
1971-1972	332	1.89	628.8	49	614.4	86.1	14.0
1972-1973	330	1.85	608.9	59	626.5	68.3	10.9
1973-1974	344	1.94	668.3	71	673.0	63.9	9.5
1974-1975	342	1.84	627.9	64	632.6	55.8	8.8
1975-1976	349	1.85	645.0	76	643.8	57.0	8.9
1976-1977	352	2.00	702.6	83	682.7	76.9	11.3
1977-1978	349	2.02	703.9	84	693.7	87.1	12.6
1978-1979	347	2.17	752.5	90	744.8	94.8	12.7
1979-1980 ^b	350	2.11	737.1	102	745.6	86.3	11.6

^aFor notes and definitions, see the original table as cited in source.^bProjection.Source: USDA-FAS, *Foreign Agriculture Circular*. FG-24-79, Dec. 13, 1979, p. 24.

Table 23. World Total Wheat and Coarse Grain Supply and Utilization, 1960-1961 to 1979-1980.^a

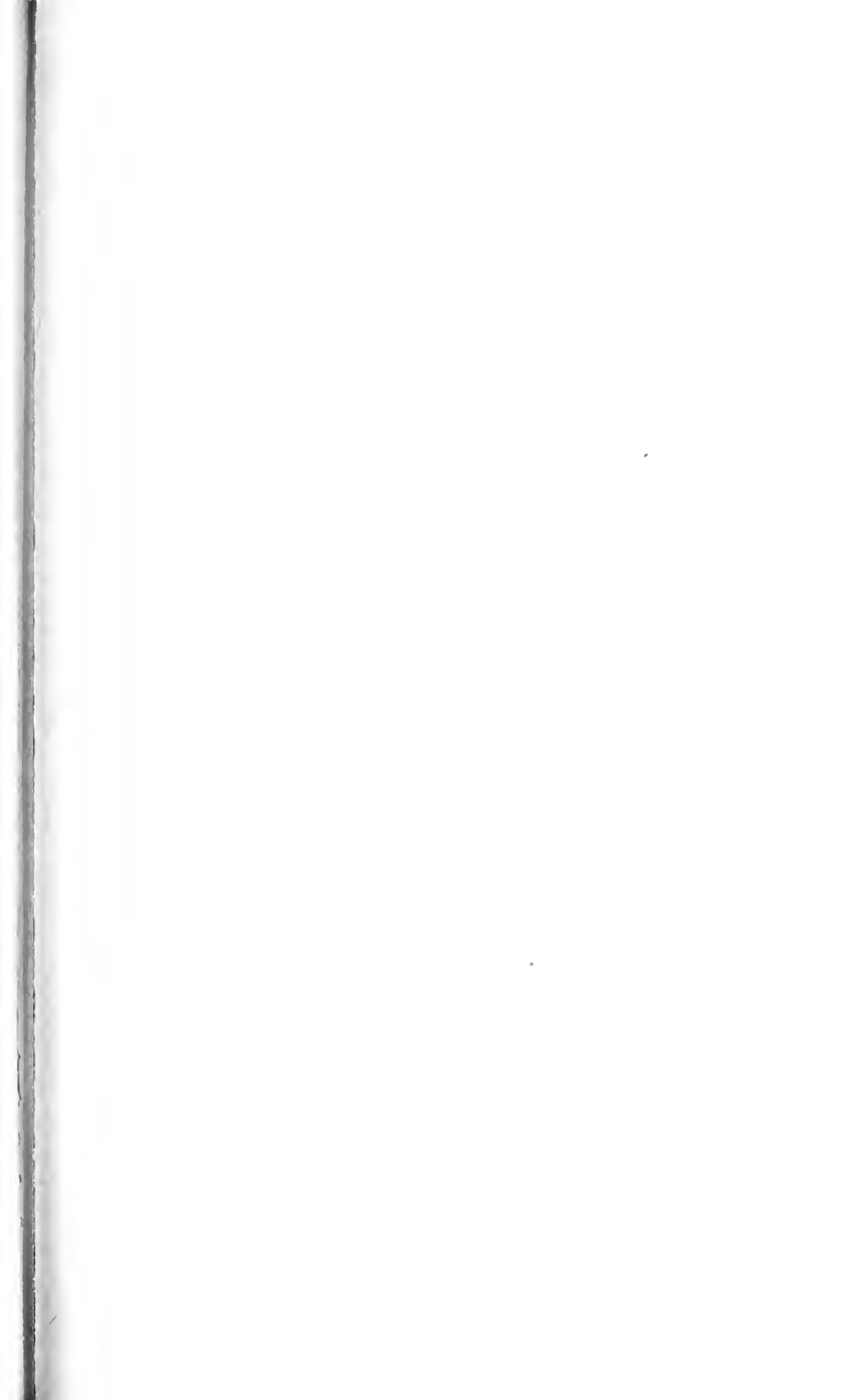
	Area Harvested	Yield (tons/ha)	Production	July/June Trade	Total Utilization	Ending Stocks	Stocks as % of Utilization
	(mil. ha.)		..... million metric tons.				
1960-1961	531	1.30	690.6	66	676.8	188.6	27.9
1961-1962	524	1.26	660.3	77	687.0	161.9	23.6
1962-1963	527	1.36	714.8	75	712.4	164.2	23.0
1963-1964	532	1.33	705.3	90	706.5	162.8	23.0
1964-1965	539	1.39	747.5	87	746.0	164.0	22.0
1965-1966	535	1.40	749.3	103	783.5	130.0	16.6
1966-1967	535	1.55	830.4	96	802.2	157.8	19.7
1967-1968	546	1.55	848.0	90	830.7	175.1	21.1
1968-1969	550	1.60	879.8	82	851.8	203.1	23.8
1969-1970	547	1.62	885.8	89	901.6	186.8	20.7
1970-1971	537	1.66	891.2	101	933.6	146.8	15.7
1971-1972	545	1.79	977.6	101	956.0	167.2	17.5
1972-1973	540	1.76	952.1	126	988.1	131.4	13.3
1973-1974	560	1.86	1,040.7	134	1,037.0	134.2	12.9
1974-1975	562	1.75	985.1	128	995.0	119.5	12.0
1975-1976	575	1.73	995.4	144	995.7	119.2	12.0
1976-1977	584	1.91	1,117.8	146	1,060.8	176.2	16.6
1977-1978	575	1.89	1,086.5	156	1,094.0	168.7	15.4
1978-1979	573	2.08	1,191.4	161	1,160.3	199.9	17.2
1979-1980 ^b	576	1.98	1,140.0	182	1,167.9	172.0	14.7

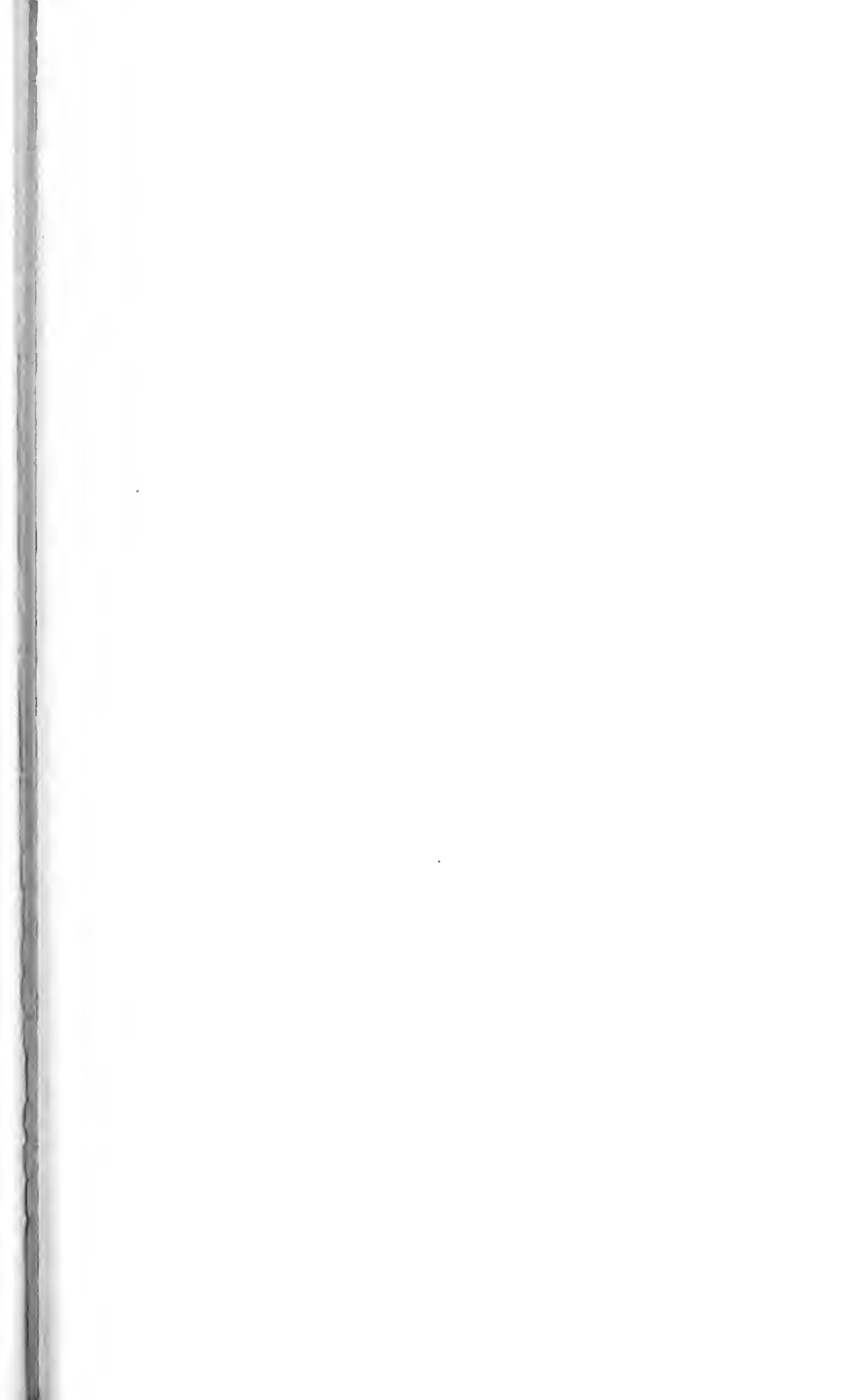
^aFor notes and definitions, see the original table as cited in source.^bProjection.Source: USDA-FAS. *Foreign Agriculture Circular*. FG-24-79, Dec. 13, 1979, p. 24.

Table 24. World Rice Supply and Utilization, 1966-1967 to 1979-1980.^a

Area Harvested	Yield (tons/ha.)	Production Rough	Production Milled	Cal Yr Exports	Total Utilization	Ending Stocks	Stocks as % of Utilization
.....million metric tons							
1966-1967	120.6	2.13	256.7	173.9	7.4	174.2	9.6
1967-1968	122.4	2.27	277.9	188.2	6.8	183.8	12.7
1968-1969	123.6	2.27	280.4	189.8	7.1	185.7	16.4
1969-1970	127.0	2.30	292.1	197.5	7.8	193.8	18.8
1970-1971	126.5	2.39	302.5	204.5	8.1	204.5	18.9
1971-1972	127.6	2.42	308.6	208.6	8.1	210.4	16.2
1972-1973	126.6	2.33	294.8	199.5	7.8	203.1	10.8
1973-1974	130.5	2.44	318.9	215.7	7.9	213.5	12.7
1974-1975	132.6	2.45	325.5	220.0	7.3	221.8	11.1
1975-1976	147.8	2.52	372.1	250.6	9.6	242.3	18.6
1976-1977	146.5	2.47	361.7	243.7	11.5	244.2	17.2
1977-1978	143.9	2.58	371.1	250.2	9.4	245.2	22.2
1978-1979	144.8	2.66	385.5	259.9	11.7	254.9	27.2
1979-1980	139.4	2.64	368.6	248.4	11.3	252.4	23.2

^aFor notes and definitions, see the original table as cited in source.Source: USDA-FAS. *Foreign Agriculture Circular*. FG-24-79, Dec. 13, 1979, p. 24.







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